REVITALIZING TECHNICAL EDUCATION

Report of The Review Committee on AICTE

सत्यमेव जयते

Ministry of Human Resource Development
Government of India

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INDEX

PREFACE

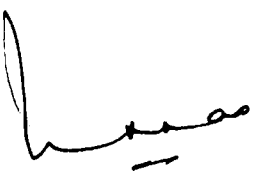
The constitution of the All India Council for Technical Education (AICTE) in 1987 through an act of Parliament to take over the planning, organization and administration of engineering education in India was indeed a significant milestone in the development of technical education in India. During the last 15 years of its existence, the AICTE has attempted to carry out its mandate and to streamline the development of technical education in the country in spite of the explosive proliferation in the establishment of technical institutions, particularly since 1990, with the large scale entry of private, unaided, self-financing institutions.

The Ministry of Human Resource Development set up an expert committee in November 2002, to review the functioning of the AICTE and suggest steps for improvement within the framework of the AICTE Act. The committee carried out extensive discussions with all stakeholders in 11 meetings at seven different places, Delhi, Kolkata, Chennai, Bangalore, Mumbai, Chandigarh and Goa. The stakeholders included representatives of State Governments, Universities, Government, Government-aided and Self-financing technical institutions dealing with engineering, pharmaceutical, management, hotel management, architecture and town planning and applied arts. The committee also had useful discussions with the Chairman, UGC, the Secretary, Department of Science and Technology, the Director General of CSIR, the Chairmen of the various Boards of Studies constituted by the AICTE, Directors of IIT's and IIM's and representatives of professional councils and Teachers Training Institutes.

On behalf of the Review Committee, I wish to place on record our debt of gratitude to all these representatives for sparing their time and assisting the committee with their critical appraisals, expert opinions and suggestions for improvement. The committee is particularly thankful to Dr. R. A. Mashelkar, Director General, Council of Scientific and Industrial Research, Dr. V. S. Ramamurthy, Secretary, Department of Science & Technology, Dr. Arun Nigvekar, Chairman, UGC and the large number of Secretaries of Education of different States in the country for their participation in the meetings.

The Review Committee is deeply indebted to Prof. R. Natarajan, Chairman, AICTE, Prof. R. S. Nirjar, Secretary of the Committee, who continued to assist the committee even after the completion of his tenure, Dr. P. N. Razdan, Advisor, AICTE who acted as the Convener of the Committee after Prof. Nirjar's tenure in the AICTE was completed and Dr. Renu Bapna, Director, AICTE for their total involvement with the work of the committee. The Committee also thanks the large number of officers and staff of the AICTE both at Delhi and at different regional levels who provided invaluable assistance to this Committee in the completion of its task.

The Committee has reviewed the mandate and the functioning of the AICTE as objectively as possible and has made a number of recommendations, which in its opinion, are needed for enabling the AICTE to fulfill its statutory responsibilities and to ensure high quality technical education in a dynamically fast changing globalized world. The review committee has prepared a comprehensive set of recommendations including a few which may be obvious, but are likely to be overlooked for that reason. The Committee hopes that the Ministry of Human Resource Development will carefully examine these recommendations and take early steps to implement them.



(U. R. Rao)

Chairman, AICTE Review Committee

LIST OF ACRONYMS

- AICTE - All India Council For Technical Education
- AIEEE - All India Engineering Entrance Examination
- AIMA - All India Management Association
- AIMS - Association of Indian Management Schools
- AIU - Association of Indian Universities
- BIT - Birla Institute of Technology
- BOT - Build Operate Transfer
- BTE - Bureau of Technical Education
- CABE - Central Advisory Board of Education
- CAT - Combined Aptitude Test
- CBSE - Central Board of Secondary Education
- CDRI - Central Drug Research Institute
- CE - Continuing Education
- CEPT - Centre for Environmental Planning and Technology
- CHRIS - Center for Human Resource Information System
- CII - Confederation of Indian Industries
- C-NANCE - Centre for National Academic Network for Continuing Education
- COA - Council of Architecture
- CRO - Central Regional Office
- CSIR - Council of Scientific and Industrial Research
- DAE - Department of Atomic Energy
- DOEACC - Department of Electronic Accreditation of Computer Courses
- DOS - Department of Space
- DOTE - Directorate of Technical Education
- DRDO - Defence Research Development Organization
- DST - Department of Science and Technology
- EC - Executive Committee
- EFIP - Early Faculty Induction Programme
- EMD - Entrepreneurship and Management Development
- EPC - Engineering Personnel Committee

- FD - Faculty Development
- FDP - Faculty Development Programme
- GATE - Graduate Aptitude Test in Engineering
- GATS - General Agreement on Trade and Service
- GDP - Gross Domestic Product
- GRE - Graduate Record Examination
- HCL - Hindustan Computer Limited
- HMCT - Hotel Management and Catering Technology
- IAMR - Institute of Applied Manpower Research
- ICAR - Indian Council of Agricultural Research
- IGNOU - Indira Gandhi National Open University
- IIM - Indian Institute of Management
- IIMA - Indian Institute of Management, Ahmedabad
- IIMC - Indian Institute of Management, Calcutta
- IIP - Industry Institute Partnership
- IIPC - Industry Institute Partnership Cell
- IISc - Indian Institute of Science
- IIT - Indian Institute of Technology
- INAE - Indian National Association of Engineers
- INSAT - Indian National Satellite
- IPR - Intellectual Property Rights
- IRMA - Institute of Rural Management, Anand
- ISRO - Indian Space Research Organization
- ISTE - Indian Society for Technical Education
- JNTU - Jawaharlal Nehru Technological University
- MBA - Master of Business Administration
- MCA - Master of Computer Applications
- MHRD - Ministry of Human Resource and Development
- MIT - Massachusetts Institute of Technology
- MODROBS - Modernization and Removal of Obsolescence
- MOU - Memorandum of Understanding

- NAAC - National Assessment and Accreditation Council
- NAFETIC - National Facilities in Engineering and Technology with Industrial Collaboration
- NANCE - National Academic Network for Continuing Education
- NASSCOM -National Association of Software and Service Companies
- NBA - National Board of Accreditation
- NCHMCT - National Council for Hotel Management and Catering Technology
- NCP - Nationally Coordinated Projects
- NCVT - National Council for Vocational Training
- NIPER - National Institute of Pharmaceutical Education and Research
- NIT - National Institute of Technology
- NOC - No Objection Certificate
- NPE - National Policy on Education
- NTMIS - National Technical Manpower Information System
- NTS - National Testing Service
- NWRO - North Western Regional Office
- OMR - Optical Marking System
- PCB - Planning and Coordination Bureau
- PCI - Pharmacy Council Of India
- PGDBM - Post Graduate Diploma in Business Management
- PGDCA - Post Graduate Diploma in Computer Applications
- PGDM - Post Graduate Diploma in Management
- POA - Programme of Action
- PRL - Physical Research Laboratory
- PWD - Public Works Department
- QA - Quality Assurance
- QIP - Quality Improvement Programme
- R & D - Research and Development
- REC - Regional Engineering College
- RID - Research and Institutional Development
- S & HE - Secondary and Higher Education
- SME - Small & Medium Sized Enterprises

- SNDT - Shreemati Nathibai Damodar Thackersey
- SPA - School of Planning and Architecture
- STEP's - Science and Technology Entrepreneurs Parks
- SWRO - South Western Regional Office
- TAPTEC - Thrust Area Programme in Technical Education
- TBI - Technology Business Incubators
- TECH NET - Technical Education Network
- TTTI - Technical Teachers Training Institute
- UGC - University Grants Commission
- VSAT - Very Small Aperture Terminal
- WCD - Women and Child Development
- WRO - Western Regional Office
- WTO - World Trade Organization
- XLRI - Xavier Labour Relations Institute

CHAPTER 1

INTRODUCTION

1.1 Prelude

Technical education in India contributes a major share to the overall education system and plays a vital role in the social and economic development of our nation. In India, technical education is imparted at various levels such as: craftsmanship, diploma, degree, post-graduate and research in specialized fields, catering to various aspects of technological development and economic progress. The intake capacity of the Indian technical education institutions has increased manifold over the years. In order to maintain a high quality of technical education, the Government of India established in 1987, a statutory body called the **"All India Council For Technical Education (AICTE)"** for proper planning and coordinated development of the technical education system in the country, for continuous improvement of such education in relation to planned quantitative growth, for the regulation and maintenance of norms and standards in the technical education system, and for all other matters connected therewith.

The unprecedented global growth in technical education combined with increase in the number of technical education institutions in India during the last decade has resulted in pressures to constantly improve the performance of the AICTE. Its functioning needs to be regularly reviewed and revamped and made more effective.

The AICTE has also released its **VISION** statement, which states as follows:

"To be a world class organization leading technological and socioeconomic development of the country by enhancing the global competitiveness of technical manpower and by ensuring high quality technical education to all sections of the society."

It was therefore felt that in order to meet the forthcoming challenges in this arena, urgent measures are required to revitalize the Technical Education system in the country for sustainable development and economic growth, through technical education of assured quality. Since the AICTE is the statutory body responsible for proper planning and coordinated development, a comprehensive and critical review of the functioning of the

AICTE was required to assess the mandate of the AICTE fulfilled to date and identify what needs further attention. In this context, Ministry of Human Resource Development, Department of Secondary and Higher Education vide its letter dated November 11, 2002 constituted a committee to review the functioning of the AICTE under the **Chairmanship of Prof. U.R. Rao, Former-Chairman, ISRO** along with the following distinguished members:

- Prof. Ashoka Chandra, Member
  Former Spl. Secretary, Department of S & HE,
  Government of India
- Prof. P.V. Indiresan, Member
  Former Director, IIT Madras
- Smt. Kiran Aggarwal, Retd IAS Member
  Former Secretary, Dept. of WCD
- Prof. R.S. Nirjar Secretary
  Former Member Secretary, AICTE

1.2 Terms of Reference

The following Terms of Reference were provided by MHRD:

i. To review the functioning of the AICTE and to assess whether it is in accordance with the objectives for which the statutory body was set up.

ii. To redefine the role of the AICTE in view of the emerging changes

iii. To review implementation of various schemes as well as its process of granting approval and to suggest modifications/ improvements required.

iv. To examine the aspect of coordination of activities of the AICTE, UGC, Subject-matter Councils, State Governments and to suggest steps for further improvement within the framework of the AICTE Act; and

v. Any other item as deemed fit by the Committee.

1.3 The Approach

The Committee was initially apprised of the current activities and functioning of the AICTE through presentations and discussions with Advisors and Chairmen of Board of Studies of the AICTE. Based on the detailed discussions during these meetings, the various issues related to the Terms of Reference, which need special attention, were identified.

A series of meetings were held at various places in India. Discussions and interactions were held with distinguished academicians, senior professionals and experts in the field of Technical Education. Meetings were also held with Chairman, University Grants Commission; Former Vice Chairmen, AICTE; Director General, Council of Scientific and Industrial Research; Secretary, Department of Science and Technology, Government of India; Directors of IIMs; Directors of IITs; Chairmen of Regional Committees of AICTE; Chairmen of various All India Boards of AICTE; State Secretaries of Technical Education; Vice Chancellors of Universities; Principals of Government, Government Aided colleges & reputed self financing institutions in the field of Technical Education; Directors of NIT's; Principals of TTTIs and the Chairman, NIIT. The list of meetings held at different places is placed at Appendix 1.1.

The above meetings held in different regions of the country included presentations by Regional Officers of the AICTE depicting the growth statistics, progress of the region, present scenario, regional problems and issues and challenges ahead of the AICTE. The distinguished members from diverse backgrounds invited for these meetings expressed their views on issues of concern. They submitted their suggestions in the form of Concept Note, White Paper, and Background Paper, which were helpful in preparation of the final report by the Committee.

The necessary primary data required by the Committee was provided by the All India Council for Technical Education and the secondary data was made available from publications of Census, NTMIS project reports and other related study reports and published papers concerning engineering and technology education

1.4 Structure of the Report

This report consists of ten Chapters.

Chapter 1 Introduction

Chapter 2 Historical Background: Technical Education in India

Chapter 3	A Perspective of Technical Education
Chapter 4	Performance Review of the AICTE Functioning/ Activities
Chapter 5	Special Issues in Management, Pharmacy and Architecture Education
Chapter 6	Review of the AICTE Schemes
Chapter 7	Coordination with other Agencies
Chapter 8	Technical Education in the Context of Globalization
Chapter 9	Tasks Ahead and Role of the AICTE
Chapter 10	Summary and Recommendations

The report presents a critical appraisal of the perspective of Technical Education in the country, with a focus on future needs in the context of a dynamic globalized environment. An effort has been made to critically review the functioning and activities of the AICTE by identifying major issues, which need further attention. The report recommends concrete steps, which need to be taken to bring about the desired changes in the functioning and activities of the AICTE with the estimated financial implications.

The recommendations offered here are aimed at enabling the AICTE to fulfill its mandate and transform it into a dynamic organization.

Appendix – 1.1

List of Important Meetings Held

(A) The Meetings held at the AICTE Head Quarter and at Regional Offices for better interaction with the AICTE Officials and all the stakeholders of technical education

• Meeting at the AICTE, Head Quarter	November 28, 2002
• Meeting at the AICTE, Head Quarter	December 20, 2002
• Meeting at the AICTE, Head Quarter	January 6 & 7, 2003
• Meeting at IC & SR Building, IIT Chennai for South & South Western Region	February 3 & 4, 2003
• Meeting at J. B. Institute of Management Studies, SNDT University, Mumbai for Western & Central Region	February 18 & 19, 2003
• Meeting at Geological Survey of India, Kolkata For Eastern Region	March 11 & 12, 2003
• Meeting at TTTI, Chandigarh for North and North Western Region	March 26, 2003
• Meeting at the AICTE, New Delhi with CM, UGC, Director, IIT's, IIM's, Secretary DST, DG, CSIR, State secretaries, Principal TTI's, NIIT's/REC's	April 28 & 29, 2003
• Meeting at Bangalore, inviting experts related to fields of HMCT, Architecture and Pharmacy	May 9, 2003

• Meeting at AICTE, New Delhi for preparation of Study Report and interaction with IIM Directors	June 3, 4 & 5, 2003
• Meeting at Goa, inviting Secretary, Technical Education, Principals and Senior Professors of the AICTE approved institutions in the state	August 12 & 13, 2003

(B) The meetings held for discussions, deliberations and finalization of the Report by the committee members:

• Meeting at AICTE, New Delhi	April 3 & 4, 2003
• Meeting at SWRO of AICTE, Bangalore	June 18, 19 & 20, 2003
• Meeting at AICTE, New Delhi	July 8, 9 & 10, 2003
• Meeting at AICTE, New Delhi	July 21, 22 &23, 2003
• Meeting at SWRO of AICTE, Bangalore	August 4 & 5, 2003
• Meeting at AICTE, New Delhi	August 25 & 26, 2003
• Meeting at AICTE, New Delhi	September 8, 2003
• Meeting at AICTE, New Delhi	September 12 & 13, 2003
• Meeting at AICTE, New Delhi	September 20, 2003

CHAPTER 2

HISTORICAL BACKGROUND: TECHNICAL EDUCATION IN INDIA

2.1 Technical Education in Ancient India

Our great saints and seers have been showing the entire world the path of enlightenment leading to the ultimate truth since the dawn of civilization. Even during the Vedic period (1000 - 800 BC) India had some of the prominent institutions of higher education, which attracted scholars from different parts of the world to come to India in pursuit of knowledge. Universities of Takshashila and Nalanda survived till the end of the fifth and twelfth century AD respectively. The other Vedic centers of education were located at Vallabhi, Vikramshila, Kashi, Nadia, Ujjain and Kanchi.

The high quality of the manufactured articles available during the medieval period is proof of the excellent system of vocational training. People took great interest in vocational education on account of which trained workmen of every trade were available in abundance during that period. The teaching of Science subjects was introduced at the Oxford and Cambridge universities in England as late as in the 19th century. The importance of technical education in the new industrial age in India was realized in the second half of the 19th century, resulting in the establishment of modern universities and leading institutions in India.

2.2 Development of Modern Technical Education

2.2.1 Development during 19th Century

- The British Government initiated activities relating to military, civil administration or education mainly in Calcutta, Bombay and Madras. It is at these centers that the earliest efforts for establishing schools for formal technical education were made.
- The first survey school namely "The Madras Survey School" which was started in Madras in 1794 was expanded in 1857. This school was later to grow into the Engineering College, Guindy.
- The importance of Civil Engineering as a branch of instruction for Indians began to attract attention of authorities in 1840's. Survey classes were started in Hindu College Bengal (1817), Elphinstone Institution, Bombay (1844) and Saharanpur School (1845).

- When the construction of the Ganga canal was started in 1842, it was then that Lt-Governor James Thomason of the North Western Province proposed to the government to form a nucleus at Roorkee for training engineering personnel at various levels for the public works of the country. A college was established in 1847 which started functioning from January 1848 under the principalship of Lt. Col. R. Maclagan.

- During 1842 it was felt that the "The Madras Survey School" was not adequate for the requirements of the PWD and there was a necessity for establishment of an engineering college also. The Government thus agreed on the need to upgrade the Madras Survey School and finally the Civil Engineering College came into existence at Madras. The College was affiliated to Madras University and became the first institution in India to offer a degree course in Civil and Mechanical Engineering.

- It was in 1854 that the establishment of modern universities in India was first recommended by the Wood's Education Despatch, and as a consequence three Universities in the presidency towns of Bombay, Calcutta and Madras were set up in 1857.

- A College was established in 1854 at Bombay for imparting instructions in various aspects of Civil Engineering to surveyors, overseers, foreman and artisans. The Mechanical School at Poona was also converted into the Poona Civil Engineering College in 1864 and affiliated to the University of Bombay.

- The Civil Engineering College, Calcutta started functioning in the year 1856. Later, in May 1887, it was re-christened as Civil Engineering College, Sibpur. Finally in 1920 it was given its present name, Bengal Engineering College, Sibpur.

- In 1859, a scheme called the Stanley Scheme was initiated by the Secretary of State for India in London to fill most of the vacancies in PWD in India by direct recruitment in England. The products of the Indian engineering colleges were thus deprived of job opportunities, with the result that many of them went unemployed or were underemployed.

- By late 1890's, in the presidencies of Madras and Bombay, a number of Survey and Industrial Schools were started. The number of such schools reached about two dozen in Madras presidency and one and a half dozen in Bombay presidency. At higher level also, a technical institute – the Victoria Jubilee Technical Institute was started in Bombay in 1887.

- The Government of India appointed an Education Commission to review the progress of secondary education in the country. Sir. A.P. MacDonnell, officiating Secretary to the Government of India prepared a memorandum in 1886 on the existing status and future prospects of technical education.

- In the presidential addresses at the sessions of the Indian National Congress the necessity of technical education in India was always stressed upon. The nationalist sentiment for technical education found its greatest exponent in J. N. Tata, who created an endowment worth Rs.30 lakhs in 1898, to promote a scientific research institute, leading finally to the establishment of the Indian Institute of Science, Bangalore.

At the end of the 19th century the technical education in India consisted of only 4 engineering colleges at degree level, about 20 survey and technical institutes, and about 50 industrial schools. Government support for the development of technical education came to a standstill by 1875. In the next quarter century, the engineering colleges barely continued to exist.

2.2.2 Establishment of an Engineering College at Roorkee

The establishment of an Engineering College at Roorkee was originally suggested in 1846 to the Hon'ble Mr. James Thomason, Lt. Governor of the then North-West Province (which was later known as United Province of Agra and Avadh and now consists of Uttaranchal & Uttar Pradesh) by Sir Proby Cautley of the Bengal Artillery, the famous designer and builder of the Ganges Canal, to train officers and subordinates for meeting the immediate needs of constructing this canal. But for the construction of the Ganges Canal, this famous college would not have come into existence and so it may be said that the College owes its birth to the waters of the Holy Ganges. This project of building a College of Engineering at Roorkee received the total support of the then Governor-General in India as the engineers were needed for carrying out the extensive works of drainage, irrigation, road making, railways, buildings, etc., around Delhi and practically all over India. The College was thus established in 1847 with Lt. Col. Robert Maclagan of the Engineers as its first Principal and the classes started in January 1848. The College has since then grown steadily from the humblest beginning to its present proud position of being one of the leading seats of learning and technical knowledge whose name is a household word in India and which has cradled many great civil engineers. The design of the College was entrusted to Lt. George Price of the First Bengal Fusiliers in 1851 and the work of construction of its buildings was started in 1852 under the supervision of the same officer. Lt. George Price with his remarkable foresight

and judgment, designed and constructed the grand edifice of the Thomason College which was built in the Renaissance style of architecture and stands majestically facing north across the plains towards the snowy peaks of the Himalayas. The construction was completed by 1856. The Court of Directors of the East India Company ordered by notification that the Roorkee College should be called the "Thomason College of Civil Engineering", by which name it was known till October 1946.

In 1946, a re-organisation committee under the Chairmanship of Prof. C.L. Fortescue of Imperial College of Science & Technology was appointed, and on the basis of its recommendations the courses in Mechanical and Electrical Engineering were also started. The women students were also for the first time permitted to join the College on the basis of their merit in Entrance Examination. The College was now renamed as Thomason College of Engineering.

The Roorkee University Bill for converting this College into a Technical University was passed by both Houses of the Provincial Legislature and consequently the University of Roorkee came into existence in 1949. The University after having a glorious history of progress in higher technical education for over a century was converted into Indian Institute of Technology in September 21, 2001 by an Act of Parliament.

2.2.3 Developments during the Period 1900-1912

- In 1900 Lord Curzon appointed Sir Edward Buck to advise him on the subject of technical and industrial Schools. The main thrust of this report, different from earlier thinking, was that technical education should be separate from general education at all levels, starting from the lowest, not only in terms of separate schools but also separate administrative set-ups.

- In 1901, Curzon convened a Conference at Shimla to discuss and evolve a policy on all educational matters, from universities to primary schools, including the industrial and survey schools. There were 156 resolutions in total and many of them related to technical education.

- In 1902, the Indian Universities Commission was appointed under the Chairmanship of Dr. T. Raleigh. The commission made many recommendations in favor of the growth of technical education.

- The Resolution on the Indian Educational Policy issued by the Governor-General in Council on March 11, 1904 advocated a new approach to the development of technical education in India. It inter alia reiterated the already existing technical scholarship scheme for studies abroad.

- The first industrial conference was held in Banaras in 1905. It impressed upon the government the desirability of establishing at least one central polytechnic institute for the whole of India and one technological college in each province.

- The Swadeshi movement, which started sweeping the whole country in the first decade of the 20th century, led to the urge for Swadeshi education too. During this decade many national educational institutions, free from government control, were also established at various places, a few of them also imparting technical education.

- In 1909, the industrial school at Lucknow, which was functioning since 1892 was remodeled and expanded. It started functioning as a technical school at Gorakhpur from 1909.

- The Bengal Textile Institute at Serampur was established in 1909.

- At Kanpur, the center of tanning industry in the province, a leather working school was opened in 1910.

- An experimental cotton weaving station, called the Central Weaving Institute, was established at Banaras in 1912.

- Following the nationalist upsurge in Bengal in 1905, some leading citizens of the province came together to found the National Council of Education. The National Council of Education established the Bengal National College in 1906 and the Bengal Technical Institute in 1910.

- The original scheme of J.N. Tata became a tripartite venture with the association of the Government of India and the Mysore Government. The institute started functioning in July 1911, with three departments namely Physics, Chemistry and Electrical Engineering

- In 1913, the Education Policy recommendations of 1904 were reviewed. According to that report the number of technical and industrial schools had grown from 88 to 218 and the number of pupils from 5072 to 10,535 during 1904 –1913.

As regards the future policy concerning the development of technical and industrial education in India, the Educational Policy Resolution of 1913 laid down that progress should continue along the lines generally followed till then. Before any practical action could be taken, the First World War broke out.

2.2.4 Growth during War Periods 1919-1945

- The Government of India appointed an Indian Industrial Commission in 1916 under the chairmanship of Sir T.N. Holland, President of the British Institution of Mining Engineers. The Indian National Congress in its session in 1918 welcomed the recommendations of the Commission and urged the government to play an active role in promoting industrialization and technical education.

- The Calcutta University Commission 1917-19 popularly known as Sadler Commission found that except at Sibpur, there was no arrangement for imparting education in engineering of a university character anywhere in Bengal.

- Although no concrete progress took place during this period, a change in approach led to the development of technical education in subsequent years. With the government becoming a little more responsive to public demand, the quality of technical education started improving. Meanwhile the following institutions were started.

    - Banaras Hindu University, Banaras in 1916
    - Harcourt Butler Technological Institute, Kanpur in 1920
    - Calcutta University College of Science and Technology, Calcutta in 1920
    - Bihar Engineering College, Patna in 1924
    - Indian School of Mines, Dhanbad in 1926
    - Maclagan College of Engineering, Lahore in 1930
    - Aligarh Muslim University in 1935 and Andhra University in 1933
    - University Department of Chemical Technology, Bombay in 1934
    - Colleges started in Princely States in 1937
    - Many other Colleges in all the four regions were also started during this period

There was however, a lack of coordination at the all India level and also to some extent at the provincial level. There was no attempt to evolve uniform standards, with the result that courses differed from college to college and school-to-school, in content and duration. Even terms such as technical, technological, engineering, school, institute and college were not used in any standardized manner. The name of the institution was often no indication of the level of instruction it imparted. The geographical distribution of these institutions was also uneven.

- In 1937 the Government of India invited two experts from England, Mr. A. Abbott, formerly Chief Inspector of Technical Schools, Board of Education, England and Mr. S.H. Wood, Director of

Intelligence, Board of Education, England, to advise on certain problems of educational reorganization and particularly of vocational education.

- The report concluded that provision for technical education at all levels was too inadequate for a large country like India and, that there was no integrated policy and no coordinating agency for its proper development.

- The Central Advisory Board of Education of the Government of India, which was founded in 1936 as a purely advisory and consultative body, had under its purview the entire gamut of education.

- The War Technicians Training Scheme was put into operation in June 1940, through the Department of Labour of the Government of India.

- The State of Morvi in Kathiawar established the Morvi Technical Institute in 1940 and the State of Rampur in the Uttar Pradesh started a Polytechnic in 1942.

- The long felt need for coordination and standardization of courses at last led to some action in 1941. The All India Association of Principals of Technical Institutions was formed.

- As per the recommendation of the Abbott-Wood committee, a Polytechnic was established in Delhi in 1941.

- In Bangalore the Jayachamarajendra Occupational Institute started functioning in 1943 and provided diploma and certificate courses in a variety of subjects.

- Laxminarayan Institute of Technology was founded in 1943 at Nagpur.

- In a span of two years, (1944-46) five new colleges were established in Madras Province.

- The Alagappa Chettier College of Technology, Guindy was established in 1944.

- The Annamalai University started its department of engineering and technology in 1945.

- The Madras government started three more colleges namely one in Coimbatore in the year 1945 and the others at Anantpur and Kakinada in the subsequent years..

- In 1944, the Reconstruction Committee of the Viceroy's Executive Council asked the Central Advisory Board of Education to prepare a report on the post-war education development in India.

- In the light of this report, the government set up an ad-hoc committee in 1945, under the chairmanship of Shri N.R. Sarkar, to advise on the provision for advanced technical education. The Massachusetts Institute of Technology in USA was cited as the model on which institutions in India might be set up.

- The Sarkar committee recommended the establishment of at least four Higher Technical Institutes, one in each of the four regions – north, south, east and west. Consequently, in the next decade, five Indian Institutes of Technology at Kharagpur, Bombay, Kanpur, Madras and Delhi, came up.

- The most important recommendation of the Central Advisory Board of Education, was to establish a national agency for planned and co-ordinated growth of technical education in India, and accordingly Government of India on November 30, 1945 passed a resolution to set up the All India Council for Technical Education (AICTE) to supervise all technical education above the high school stage.

- In 1947, Polytechnic education, was seriously lacking in regard to the eligibility, duration, standards and management. The major task of the AICTE was, therefore, coordination, standardization and improvement of polytechnic education.

- In 1947 only 53 institutions conducted Diploma Courses and they admitted only 3670 students each year.

2.2.5 Growth of Engineering Education – Post Independence Era

The Government recognized that the future economic and industrial growth of the country entirely depends on the quality of technical education imparted in our institutions and the type of practical training provided to enable the future generation of engineers to become competent innovators, designers and product manufacturers.

S. Radhakrishnan Commission Report in 1949 made several recommendations on Technical education emphasizing the need for new types of engineering and technical institutions in India. As a consequence of these recommendations, many new developments ensued in succeeding years. Curricula were revised to include general education and basic physical and engineering sciences.

- In pursuance of the Sarkar Committee Report, five Indian Institutes of Technology were established between 1950 and 1961.

- In pursuance of the recommendations of the National Development Council in November 1958, the Working Group on Technical Education and Vocational Training was appointed in February 1959, under the Chairmanship of Prof. M.S. Thacker, the then Secretary, Ministry of Scientific Research and Cultural Affairs. Many of the recommendations of the Working Group were subsequently implemented.

- Committee on "Postgraduate Engineering Education and Research" was also appointed under the chairmanship of Prof. M.S. Thacker, 1959.

- The next important landmark in the development of technical education in India was the appointment of the Education Commission in July 1964 under the chairmanship of Prof. D.S. Kothari.

  - The Kothari Commission report of 1964 contains many recommendations on technical education including the importance of practical training as an integral part of the courses and the need for industry-institution interaction.

- The expansion in technical education during the period 1947-67 was accompanied by massive investment in infrastructure in academic and residential buildings for faculty and staff, hostels, equipment, etc.

- The Planning Commission in September 1955, appointed an Engineering Personnel Committee (EPC) to undertake an overall assessment of the demand and supply position in respect of engineering personnel during the 2nd Plan period.

- The Government of India decided to implement the first part of EPC recommendations in 1957. Accordingly, it was decided to establish eight new colleges.

- As a measure designed to provide each state with a Regional Engineering College, seven more colleges were approved for establishment during the 3rd plan period.

- Fifteen Regional Engineering Colleges were thus established, one in each of the major States, by 1972. Two colleges were subsequently established at Hamirpur in Himachal Pradesh (1985) and Jalandhar in Punjab (1989) raising the total number to 17.

- Consolidation and quality improvement in the field of technical education was given importance during the period of 1967-1980. The Indian Society for Technical Education (ISTE) and four Technical Teachers Training Institutes contributed sizeably towards this goal.

- The Indian Society for Technical Education (ISTE) was registered in 1967 as a national professional society of teachers and administrators of engineering colleges and polytechnics with the main objective of advancing the cause of technological education in the country. As a strategic partner of the AICTE, ISTE has been organizing Summer and Winter Schools for the teachers of degree engineering colleges and polytechnics every year since 1965. About 3100 programmes have been arranged in which over 72,000 teachers have participated till date.

- On the recommendation of the AICTE, the Government established four Regional Technical Teachers Training Institutes (TTTIs) at Bhopal, Calcutta, Chandigarh and Madras in 1967, to meet the requirements of developing polytechnic education in their respective regions.

- Government of India constituted a "Special Committee for Reorganization and Development of Polytechnic Education" under the chairmanship of Prof. G.R. Damodaran and the report was submitted on Feb 28, 1971.

    - The Damodaran Committee report on polytechnic education was an exhaustive report stressing the need for coordinating polytechnic education with industry, making qualitative improvement and planning polytechnic education based on proper manpower estimates.

- The Apprentices Act of 1961, which sought to regulate and control the training of apprentices in trades, was amended in 1973 with a view to bring the training of Engineering graduates and Diploma holders within its purview.

- The Madan Committee report in the early 1970s made detailed recommendations on staff structure in engineering institutions.

- The Central Government formulated a programme of Quality Improvement for improving the standard and quality of technical education, with particular reference to developing the faculty of engineering colleges and polytechnics. This scheme was approved by the AICTE in 1969.

- A measure of far-reaching importance was initiated during 1976-77 when the scheme of "Direct Central Assistance" to selected engineering colleges and polytechnics was started in order to bring about a qualitative improvement in the standards of technical education.

- The Government of India set up a "Working Group on Technical Education" in November 1978 in order to examine various aspects of technical education.

- In 1979, the Government of India published a new "Draft National Policy on Education 1979", which advocated the need for creation of a machinery for dissemination of information relating to manpower needs in the field of technical education.

- In order to assess the impact of foreign technical assistance on the development of technical education in the country and to determine the areas that need to be further developed and supported through foreign technical assistance programmes, the Government of India appointed a Review Committee in June 1978 under the chairmanship of Prof. Y. Nayudamma.

- Another committee, with Prof. Y. Nayudamma as Chairman, was appointed to review the progress made in the area of postgraduate education and research in engineering and technology and make recommendation for further development.

- In June 1981 the Government of India, published "A Guideline Document" on the scheme of Community Polytechnics in India, which was started during 1978-79 on the recommendation of the AICTE.

- The National Policy on Education (NPE-1986) was a major development in the field of education in India. For the first time in the country, a national debate was initiated by publishing a document titled "Challenge of Education" which resulted in a blue print for the National Policy on Technical Education.

- The National Policy helped to focus attention of the public in general on the need to adopt innovative approaches to education which resulted in the formulation of a Programme of Action (POA) in 1992.

2.2.6 Postgraduate Education and Research

- Postgraduate education in Engineering and Technology had a late start in our country. At the time of India's independence only 6 institutions offered PG programmes in Engineering and Technology to about 70 students in all.

- The first doctorate in Electrical Engineering was awarded in 1946 from the Guindy College of Engineering, Madras. However, research leading to Ph.D. degree was not common until early 60's.

- The commendable growth in size, as well as in quality, in the last four decades was due to the positive impact of the recommendations of the two earlier PG Review Committees, one chaired by Professor M.S. Thacker (1959-61) and the other presided over by Professor Y. Nayudamma (1978-80).

- A Review Committee on Postgraduate Education in engineering was constituted in 1995 under the chairmanship of Prof. P. Rama Rao. The committee recommended urgent measures to revitalize PG education and research in engineering and technology.

- The Committee also recommended that the number of Ph. Ds in engineering & technology which was around 375 per year should be increased to around 750 per year to meet the faculty requirements of even the then existing institutions.

2.3 Management Education

The development of management education in India is a post-independence phenomenon. Management education as a separate discipline emerged in 1881, at the University of Pennsylvania, USA and in Europe it started only in the late 1950s. India took a lead in management education with the Indian Institute of Social Welfare and Business Management, Calcutta offering Postgraduate diploma in 1954. In 1957, the All India Management Association (AIMA) was created as an apex body with the active support of the Government of India.

2.3.1 Major Developments

- AIMA was intended to be a forum for developing the national managerial ethos to facilitate the furtherance of the profession.

- The AICTE constituted an Expert Committee to examine the possibility of starting management courses in Universities and other educational institutions in early 1950s.

- Based on the recommendations of the AICTE, the Administrative Staff College of India, Hyderabad was established in 1956 as a joint and cooperative enterprise of the Government of India and private industries as an autonomous non-profit institution.

- The establishment of the Indian Institute of Management, Calcutta (IIMC) in 1961 and the Indian Institute of Management, Ahmedabad (IIMA) in 1962,the establishment of the management division at the Xavier Labour Relations Institute (XLRI), Jamshedpur in 1966 and the offering of full time MBA programmes by Delhi and Bombay Universities marked a watershed in the management education system in the country.

- The Indian Institute of Management, Bangalore was established in October 1973.
- Setting up a dedicated Rural Management Institute at Anand (IRMA) largely due to the drive and perseverance of Dr. V. Kurien and his team made another unique attempt at professionalising management for rural enterprises.
- In 1979, Government of India appointed a Review Committee with Shri H.P. Nanda as Chairman. The Nanda Committee recommended the establishment of two more IIMs, one in the northern region and the other in the central region.
- The Indian Institute of Management (IIM) Lucknow, the fourth in the IIM chain, was established in 1984.
- In 1986, the AICTE approved a revised set of norms and standards for the recognition of new management schools. The Association of the Indian Management Schools (AIMS) as the National Forum of Management Schools in the country was formed on August 27, 1988, in Bangalore.
- In the 1990s, institutions were set up largely by private entrepreneurs, business organizations, and trusts in response to a perceived need for more graduates in management study.
- Indian Institute of Management, Calicut started functioning in 1997 and IIM, Indore in the year 1998.

2.4 Architecture, Town and Country Planning Education

The rich architectural heritage of India dotted all over the country, indicates that architecture must have been a well developed and practiced profession in ancient times.

- The Indian Institute of Architects in its present form was registered on September 2, 1929, under the Societies Registration Act XXI of 1860, for encouragement of the 'Study of Architecture and for Promoting the Interest of the Architectural Profession' throughout India.
- It was founded in 1917 as the 'Architectural Students Association', and was renamed in 1922 as 'The Bombay Architectural Association'. It remained allied to the Royal Institute of British Architects during the period 1925-68.

- In 1947 there were only 3 schools of architecture in India and about 300 trained architects amidst a population of 300 million.
- Apart from the J.J. College of Art and Architecture in Bombay, there was the Kala Bhawan at Vadodra and a Department of Architecture attached to Delhi Polytechnic.
- Modern town planning education in India started to develop after independence in 1947. But the orientation and contents of the education programmes adopted during this period were very much shaped by the planning ideologies of the 1920s and 30s.
- Patrick Geddes, the renowned British Town Planner, visited India during 1915-20 to advise on town planning.
- Planning and development of New Delhi, the seat of Government, also took place around this time.
- LeCorbusier designed the city of Chandigarh.
- Institute of Town Planners, India, which was formed in 1951 on the pattern of the Royal Town Planning Institute of the United Kingdom, also had a role in establishing the codes and direction of professional practice and formulating programmes of education for town planning. .
- The Institute, with the help of the Government of India, was also instrumental in establishing, in the year 1955, the first educational institution for planning in India at Delhi, namely the School of Town and Country Planning.
- There are two important milestones in the history of architectural education in India. First was the setting up of the School of Planning and Architecture (SPA) at Delhi in 1955 and the incorporation of Delhi Polytechnic into SPA in 1958. The second was the emergence of the Center for Environment Planning and Technology (CEPT) at Ahmedabad in 1962.
- Upgradation of SPA into a "Deemed University" in 1979 was another landmark in the annals of education in Architecture and Planning. This was the first University of its kind in the whole of Asia.
- The participation of the private sector during the 1990's accelerated the rate of growth, so much so that this discipline, which had only 3 centres in 1947, had 93 recognized schools by the end of 1997. Of these, thirty schools were set up during 1991-94.

2.5 Pharmacy Education

From ancient times, the Indian medicinal flora and traditional knowledge about these plants have attracted the researchers, herbalists, scientists etc., around the world. In ancient Indian history, it is mentioned that many such researchers have visited India in search of this valuable knowledge. In Rig Veda the description of Soma is described as the first medicinal plant used by ancient man. In Ayurveda, it is clearly mentioned that any patient can be cured with the help of herbs present in his surroundings.

- Diploma in pharmacy is considered to be the minimum qualification to enter the profession. Prior to the introduction of this course through Pharmacy Act, there was no course or formal training for the so-called compounders.

- Some State governments introduced "Compounders" courses, which consisted of a few months of apprenticeship in a hospital or a Government dispensary.

- Enactment of the Pharmacy Act in 1948 and framing of the first Education Regulation in 1953 (ER 53) paved the way for the introduction of a regular diploma course in pharmacy of 2-years duration, with compulsory hospital training for a minimum period of 750 hours.

- The first institution imparting Diploma in Pharmacy started functioning from the year 1954, with the introduction of D.Pharm course under ER 53 in the Birla College at Pilani.

- By the year 1969, the number of institutions increased to 34, which included programmes conducted in full-fledged pharmacy colleges, polytechnics, medical colleges and other institutions.

- The first full-fledged degree course in Pharmacy was started as early as 1932 at Banaras Hindu University; other universities started such courses only in the late 40s and 50s.

- After the implementation of the Drugs and Cosmetics Act 1940 and rules framed in 1945, degree education in pharmacy expanded because of the increased demand for graduates to cope with the phenomenal growth of the pharmaceutical industry in India.

- In 1987, the AICTE framed a model syllabus for a four year B.Pharm course and prescribed the minimum standards for infrastructure, equipment and faculty. It was left to the affiliating University to maintain and improve the academic environment and standards.

- The first postgraduate course leading to M.Pharm was started at Banaras Hindu University in April 1940.

2.6 Hotel Management

The concept of training personnel for hotels, restaurants and the catering profession in India was the brainchild of late Shri K.M. Munshi, Minister of Food in the 1950s. His wife, Smt. Leelavati Munshi, and a band of enterprising women founded the "All India Central Women's Food Council", a women's voluntary organization to give a practical shape to the idea. One such effort was the establishment of a chain of Annapoornas (cereal supplementing restaurants) throughout the country but primarily in the metropolitan cities to prepare and sell economic but nutritionally sound snacks and foods.

- In 1952 a College of Catering started functioning at Mumbai in a small hut adjacent to the Annapoorna Cafeteria near Cross Maidan, Mumbai, under the aegis of the Central Government.
- The College offered only a three-month course in the beginning and was replaced by a one-year programme in 1955.
- In March 1956, Mr. Smith took over as Principal of the College of Catering and a three-year diploma course was started which got recognition from the Directorate of Technical Education in 1958 along with grant-in-aid.
- As the network of Institutes of Hotel Management and Food craft spread considerably, the need was felt for a central regulatory body to regulate the training in these institutions. As a result, the "National Council for Hotel Management and Catering Technology" (NCHMCT) was established as an apex body in 1984.
- With the enactment of the AICTE Act in 1987, the task of development of technical education and maintenance of standards was entrusted to the AICTE.

2.7 All India Council for Technical Education (AICTE)

2.7.1 Preamble

In 1944, the Reconstruction Committee of the Viceroy's Executive Council asked the Central Advisory Board of Education to prepare a report on the postwar educational development in India. The most important recommendation of the Central Advisory Board of Education was to establish a central coordinating agency, for an all India coordinated and integrated spread and growth of technical education. In the opinion of the

Board, the first requirement for planned and balanced development of technical education was to survey existing facilities and formulate future requirements for the country as a whole by a competent body. Such a body should formulate policies, set standards and generally advise on the opening of new institutions and assist in the expansion and development of existing ones.

The Government of India, through a resolution passed on November 30, 1945, set up the All India Council for Technical Education (AICTE) to supervise all technical education above the high school stage. The Council, as constituted, consisted of representatives of the Ministries of Education, Labour, Industry, and Commerce, the Inter-University Board, the Central Advisory Board of Education, the Association of Principals of Technical Institutions, the Institution of Engineers, the Indian Legislature and the provincial governments.

The first meeting of the Council was held at New Delhi in May 1946, under the chairmanship of Sir N.R.Sarkar. Honourable Sardar Sir Jogendra Singh, Member of the Viceroy's Executive Council for the Department of Education, Health and Agriculture opened the meeting, in which three types of committees were set up for the efficient discharge of the functions of the Council.

- All India Boards of Technical Studies for each of the main subjects of technology.
- Regional Committees of the Council.
- A coordinating committee to coordinate the activities of the above committees and to act as the executive organ of the Council.

The AICTE was constituted in 1945 as an advisory body on all matters relating to technical education. Even though it had no statutory powers, it played a very important role in the development of technical education in the country. In the seventh schedule of the Indian Constitution under article 246 (List I), the following lines were included as entry 66. "Coordination and determination of standards in institutions for higher education or research and scientific and technical education", recognizing the constitutional responsibility of the central government to ensure the coordinated development of technical education in accordance with approved standards.

2.7.2 Developments since the Eighties

While the expansion in the fifties was done with the approval of the AICTE and the Government of India, the expansion in the eighties was localized mostly in the four southern states and was primarily in the self-financing sector without the approval of the AICTE and the Government of India.

- It was in this period that the National Policy on Education 1986 made a specific mention of the need to make the AICTE a statutory body. It stated that:
  - "The All India Council for Technical Education will be vested with statutory authority for planning, formulation and maintenance of norms and standards, accreditation, funding of priority areas, monitoring and evaluation, maintaining parity of certification and awards and ensuring the coordinated and integrated development of technical and management education".
  - "In the interest of maintaining standards and for several other valid reasons, the commercialization of professional and technical educations will be curbed".
  - "An alternative system will be developed to involve private and voluntary effort in this sector of education, in conformity with accepted norms and goals".
  - In view of the above, the AICTE became a statutory body through an Act of Parliament, in December 1987.
  - The Act laid down the powers, functions and structure of the AICTE. The Act came into force with effect from March 28, 1988.
  - The statutory All India Council for Technical Education was established on May 12, 1988.
  - The Council was established with a view to ensure proper planning and coordinated development of the technical education system throughout the country, promotion of qualitative improvement of such education in relation to planned quantitative growth and regulation and proper maintenance of norms and standards in the technical education system for matters connected therewith.
  - The purview of the AICTE covers programmes of technical education including training and research in Engineering, Technology, Architecture, Town Planning, Management, Pharmacy, Applied Arts and Crafts, Hotel Management and Catering Technology etc at different levels.

2.8 Growth of Technical Education after 1986

- During the last five decades, there has been phenomenal development of technical education. A serious situation has arisen in recent years because of the mushroom growth of a large number of private technical institutions and polytechnics.

- Barring some exceptions, there is scant regard for maintenance of standards. The Estimates Committee of the Sixth Lok Sabha in its Ninth Report on Higher Technical Education took a very serious note of this situation.

- When private self-financing institutions came in large numbers in the eighties in Southern India, there were no effective mechanisms to control their functioning.

- The period between 1980-97 is characterized by many new initiatives of the AICTE of which the following important ones deserve special mention:

  - Emergence of Unaided Private Institutes in Engineering, Management, Pharmacy and Architecture.
  - National Technical Manpower Information System.
  - Modernization and Removal of Obsolescence and Research Promotion Schemes for Institutional Development.
  - Development of Industry - Institute Interaction Programme for Technical Institutions.
  - Constitution of National Institutes of Technology and granting them Deemed University status.
  - Establishment of Indian Institutes of Information Technology.

The details of growth pattern of technical education are shown in Figure 2.1 to 2.7 on subsequent pages.

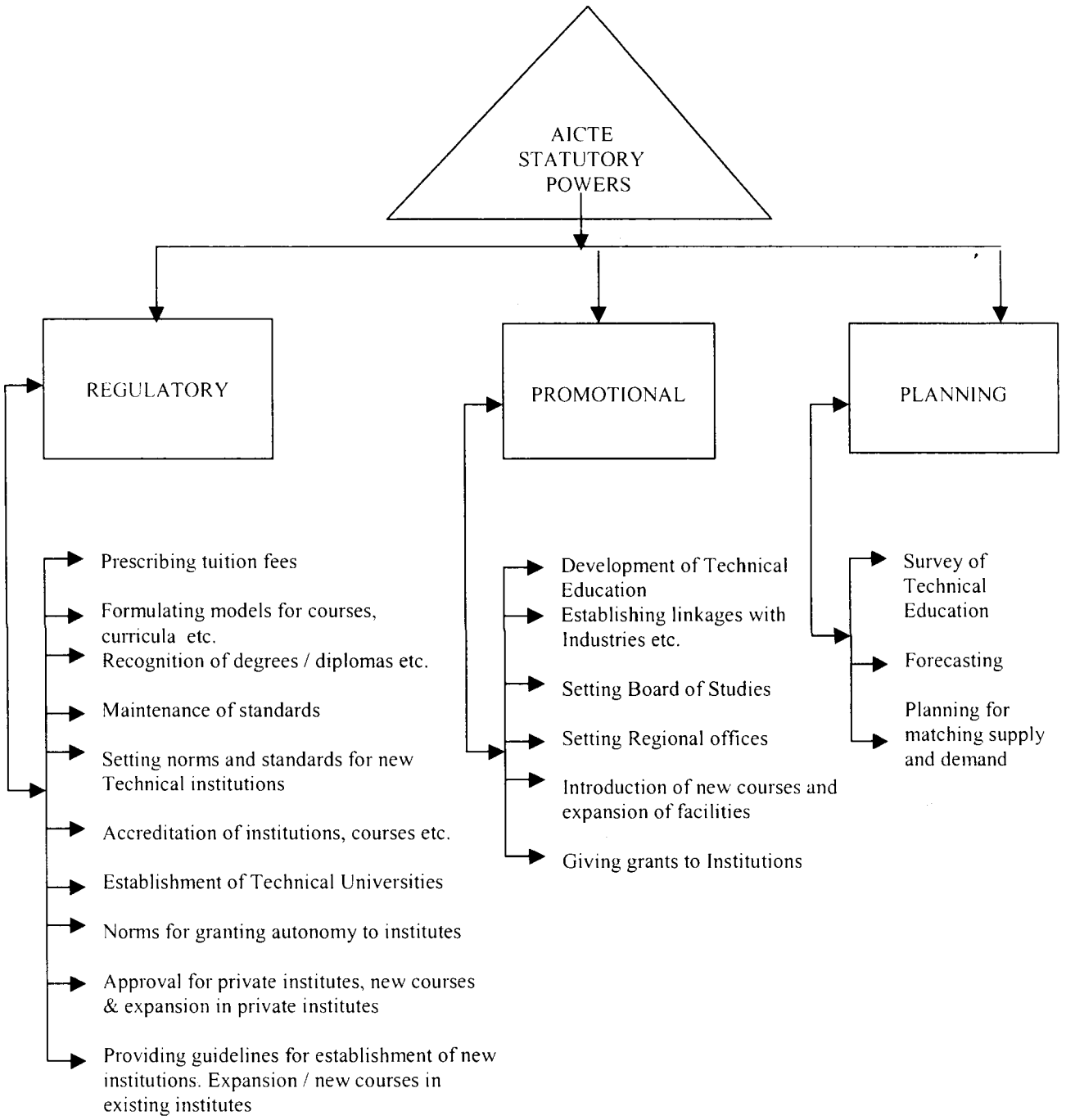
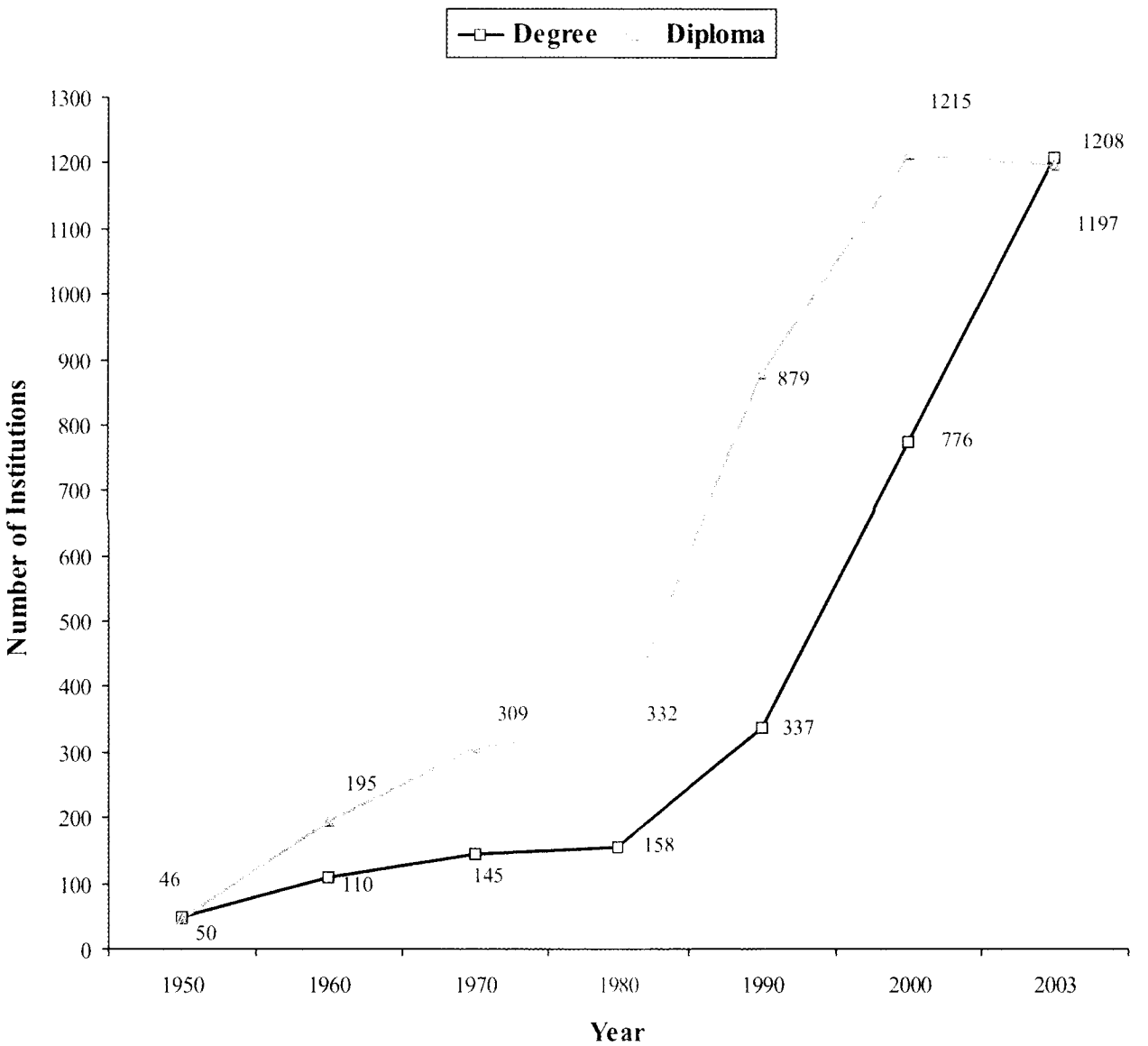


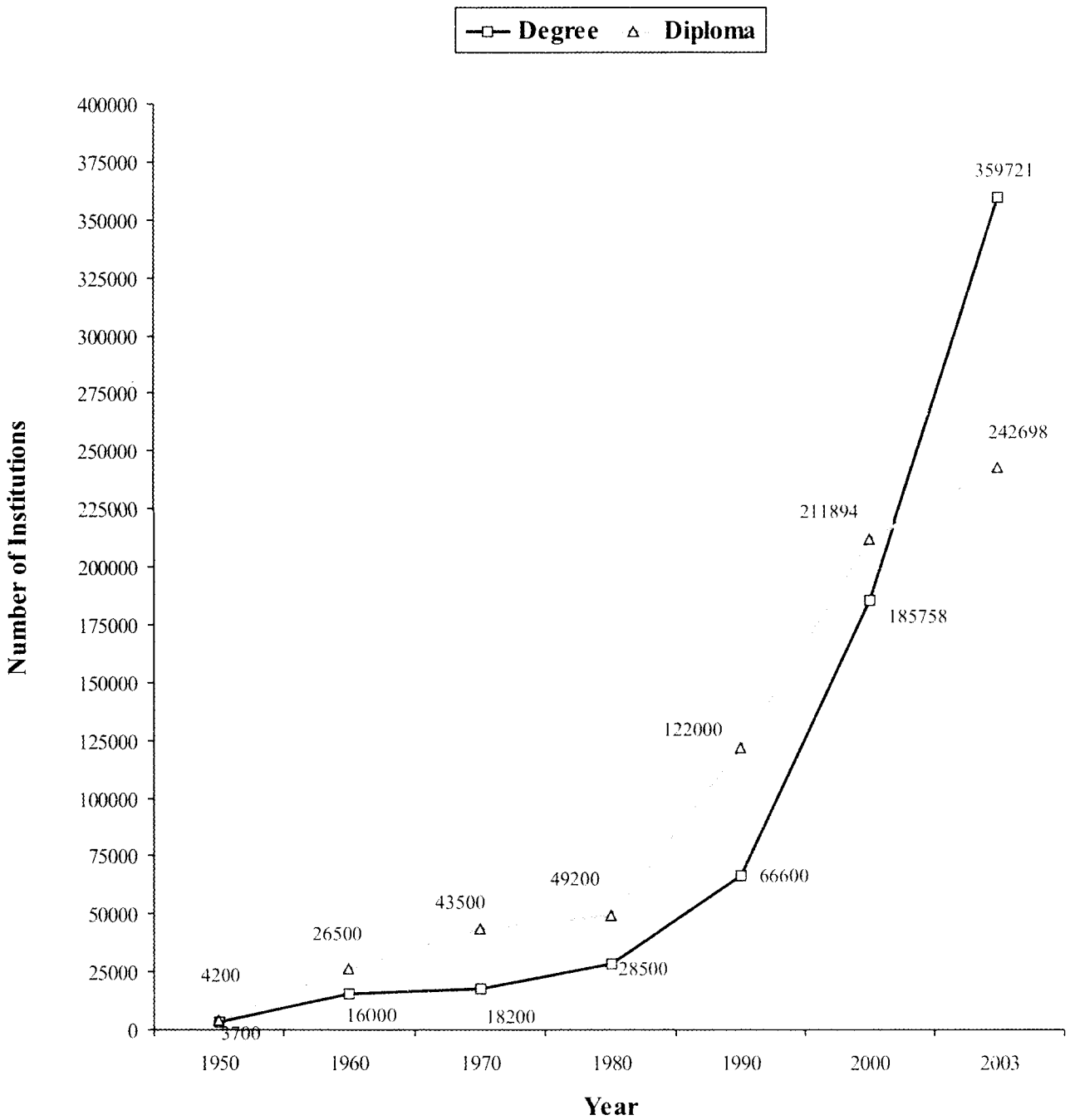
Fig. 2.1: STATUTORY POWERS OF AICTE

Fig. 2.2 : GROWTH IN THE NUMBER OF DEGREE-DIPLOMA INSTITUTIONS IN ENGINEERING



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 2.3 : GROWTH OF SANCTIONED INTAKE IN DEGREE-DIPLOMA INSTITUTIONS IN ENGINEERING



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 2.4 : GROWTH IN THE NUMBER OF DEGREE INSTITUTIONS IN PHARMACY, ARCHITECTURE, HMCT

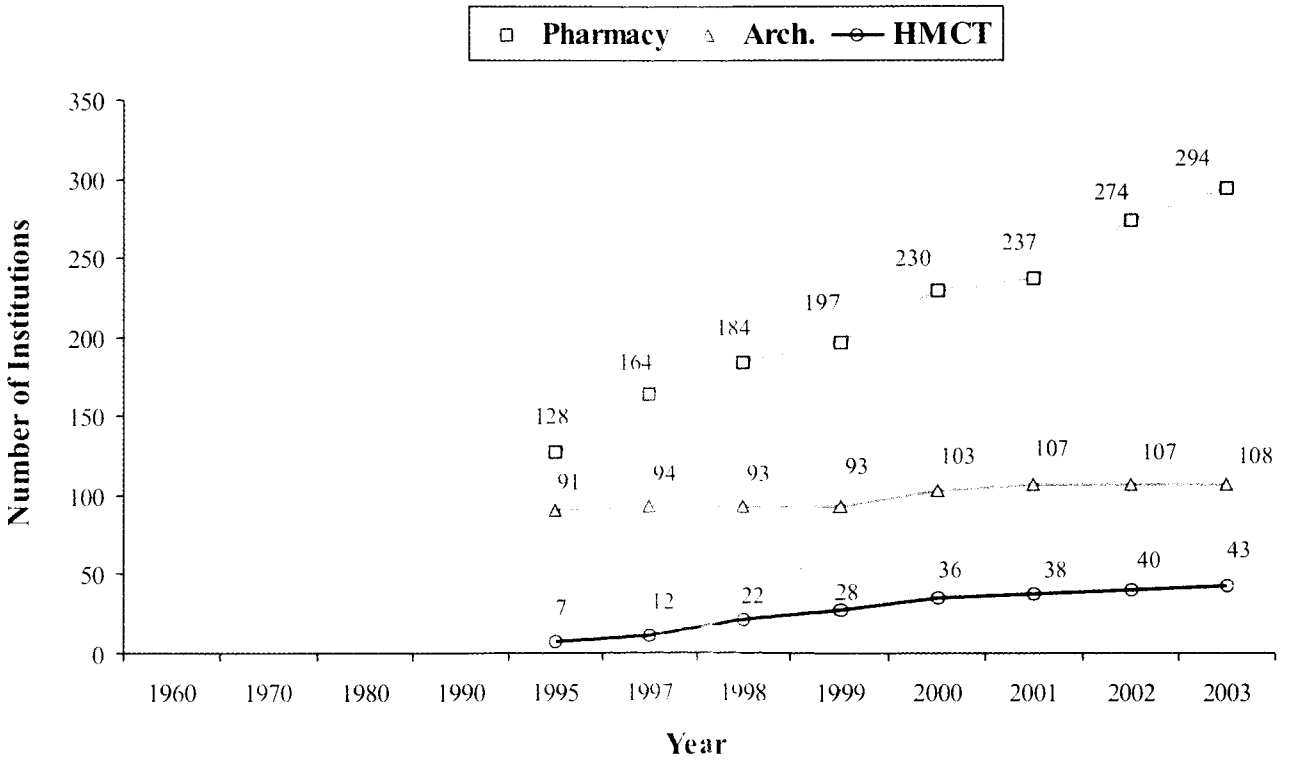
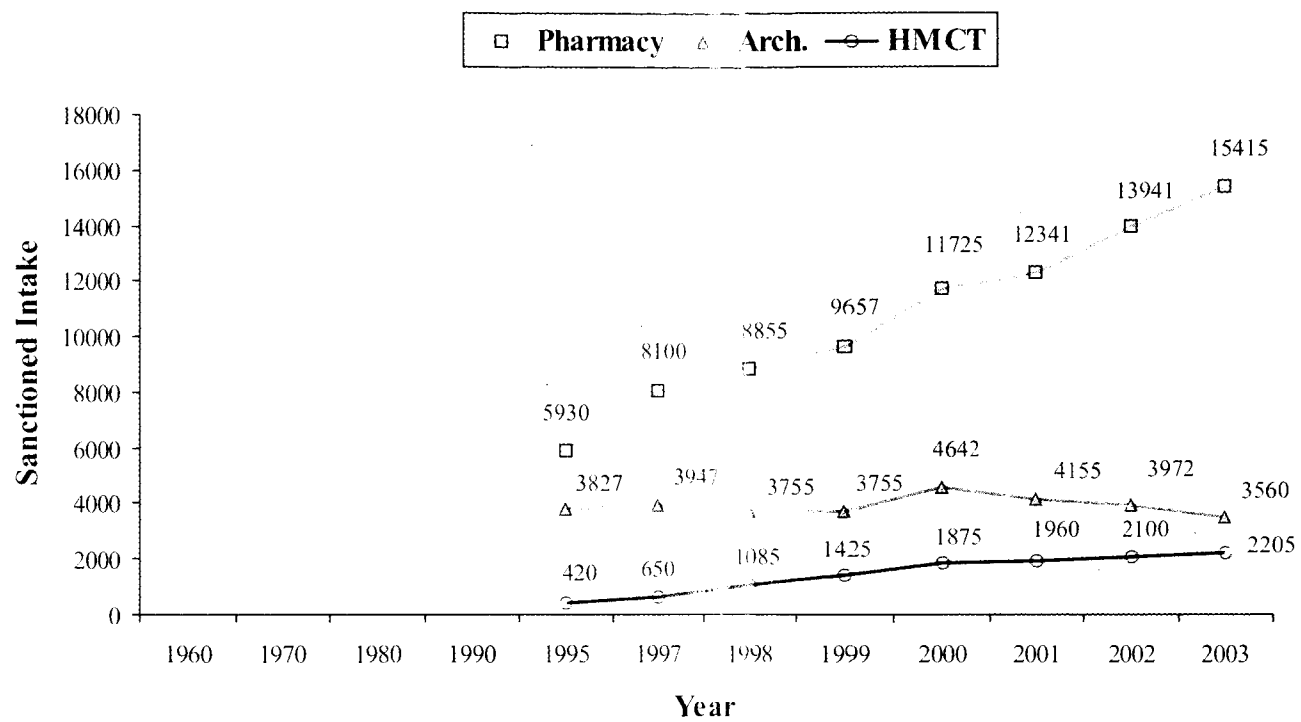


Fig. 2.5 : GROWTH OF SANCTIONED INTAKE IN DEGREE INSTITUTIONS IN PHARMACY, ARCHITECTURE, HMCT



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 2.6 : GROWTH IN THE NUMBER OF DEGREE INSTITUTIONS OF MCA-MBA

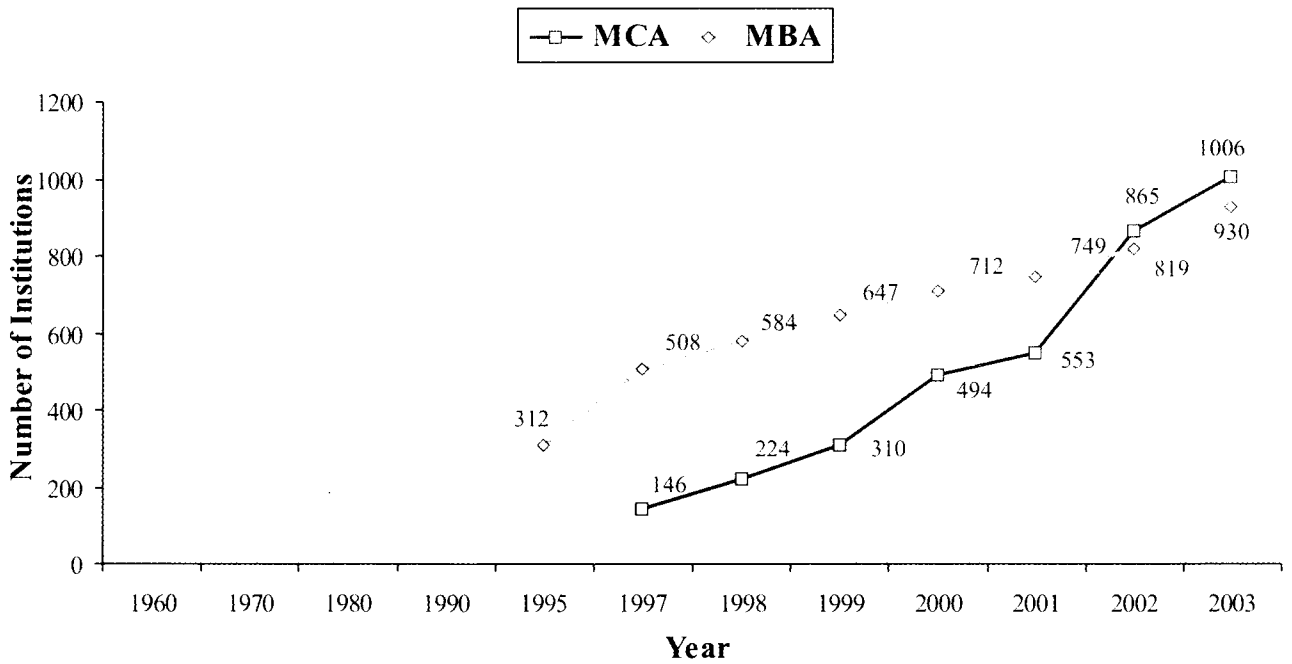
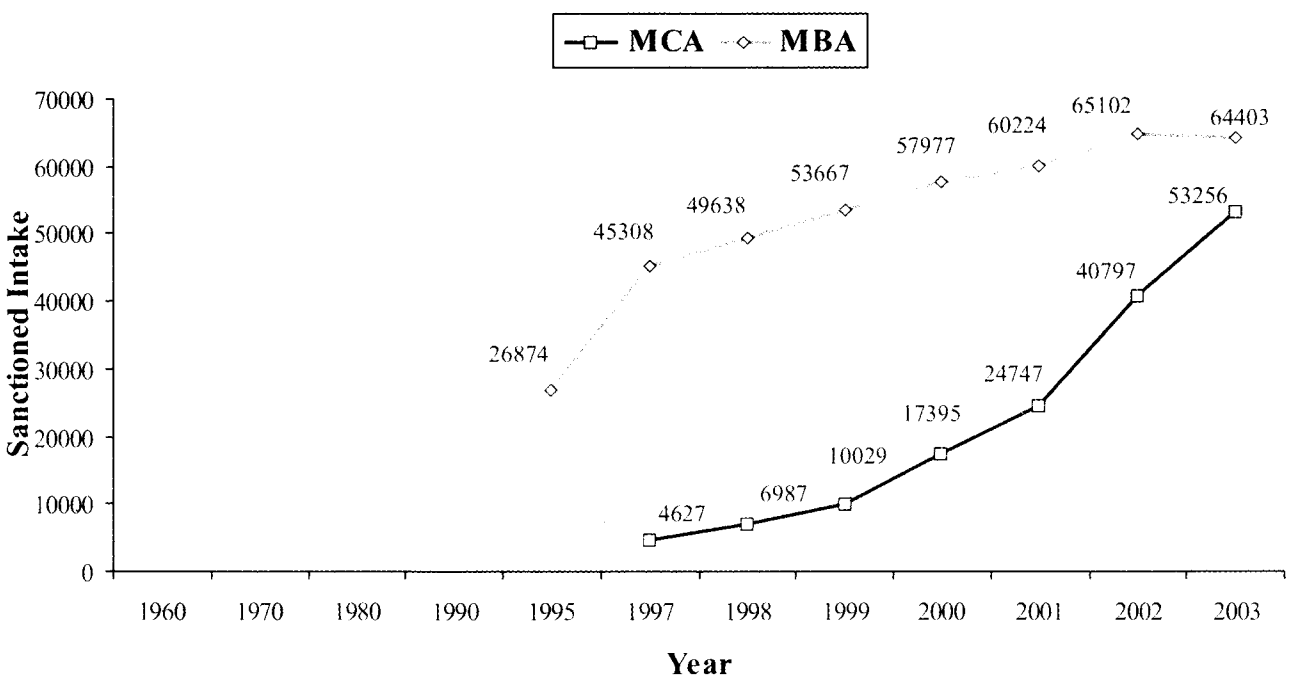


Fig. 2.7 : GROWTH OF SANCTIONED INTAKE IN DEGREE INSTITUTIONS OF MCA-MBA



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

CHAPTER 3

A PERSPECTIVE OF TECHNICAL EDUCATION

3.1 Science and Technology Policy of 1958

The 1958 scientific policy resolution of the Government of India clearly states "The key to national prosperity, apart from the spirit of the people in the modern age, is the effective combination of three factors, technology, raw materials and capital, of which the first is perhaps the most important". This policy clearly defined its vision with the statement "It is an inherent obligation of a great country like India, with its tradition of scholarship and original thinking and its great cultural heritage, to participate fully in the march of science, which is probably mankind's greatest enterprise today".

The policy document elaborated on the aims of the policy in specific terms as follows:

- To foster, promote and sustain the cultivation of science and scientific research in all its aspects – pure, applied and educational.
- To ensure adequate supply of research scientists of the highest quality.
- To encourage and initiate, with all possible speed, programs for the training of scientific and technical personnel to fulfill the needs of the country in science and education, agriculture, industry and defense.
- To ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity.
- To encourage individual initiative for the acquisition and dissemination of knowledge and for the discovery of new knowledge in an atmosphere of academic freedom and
- To secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.

Based on the scientific policy resolution of 1958 and three decades of planning, the Government of India formulated its Technology Policy Statement in 1983 which clearly enunciated the need to develop indigenous technology which must relate to the people's aspiration, tangible improvement in the living conditions of the weakest section of the population and speedy development of backward regions through technical self-reliance.

In areas where imported technologies are essential, the policy stressed the importance of efficient absorption, adaptation and upgradation of such technologies and, ensuring competitiveness at international level. The technology policy viewed technology development in the broadest sense, covering agricultural, services and manufacturing sectors over a wide spectrum ranging from village, small-scale and cottage industries to medium, heavy and sophisticated industries spread over public, private and joint sectors. The aims and objectives of the 1983 technology policy were elaborated as:

- To attain technical competence and self-reliance and to reduce vulnerability particularly in strategic and critical areas, making maximum use of the indigenous resources.
- To provide maximum gainful and satisfying employment to all strata of society with emphasis on employment of women and weaker sections of the society.
- To use traditional skills and capabilities and making them commercially competitive.
- To promote basic research and building of excellence giving special attention to the development of technology base in frontier areas such as information technology, material science, electronics and communication technology.
- To ensure correct mix between mass production of technology and production by the masses.
- To avoid obsolescence of technology through modernization.
- To develop technologies, which are internationally competitive and have export potential.
- To improve productivity through greater efficiency and enhance reliability of performance and output.
- To ensure harmony with the environment, preserve ecological balance and improve the quality of the habitat.

It is very gratifying to note that the scientific as well as the technology policy, from the very beginning, projected integrated development of science and technology for societal benefits, need for enhanced productivity, reliability and quality to ensure global competitiveness, rapid attainment of self-reliance in all strategic and critical areas of technology, avoidance of obsolescence and safeguarding the environment and improvement of living conditions of all the people of the country with particular emphasis on women and weaker sections of the society as their main goal and vision.

3.2 National Policy on Education

Recognizing that education is the main highway to ensure that fruits of scientific and technological development reach all sections of the society, essential for economic and cultural development of the country's national integration and realizing the ideal of socialistic pattern of society, the Government of India formulated the National Policy on Education (NPE) in 1968 on the broad lines suggested by the Education Commission in 1966. The 1968 NPE laid special stress on the need for radical reconstruction of the education system, to improve quality at all stages and gave much greater attention to science and technology, the cultivation of moral values and a closer relation between education and the life of the people. In the wake of the phenomenal developments in science and technology, changes in the cultural dynamics of the nation, rapid economic and industrial development and considerable expansion of educational facilities in the country, the Government of India issued a New Education Policy in 1986 recommending the establishment of the AICTE as a statutory body for planning, organization and administration of technical education in India, which became a reality in 1987 through an act of Parliament.

The 1986 NPE itself was again modified in 1992 to take into account the dynamic changes in the socio-economic sector of the country. The revised 1986 NPE specifically addressed the strategy of implementation along with the required funding, infrastructure and organizational support needed to realize the goals of education enunciated in the Policy. It elaborated on the functions and mandate of the AICTE stating "The AICTE, which has been given statutory status, will be responsible for planning, formulation and the maintenance of norms and standards, accreditation, funding of priority areas, monitoring and evaluation, maintaining parity of certification and awards and ensuring the coordinated and integrated development of technical and management education. Mandatory periodic evaluation will be carried out by a duly constituted accreditation board. The council will be strengthened and it will function in a decentralized manner with greater involvement of State Governments and technical institutions of good quality".

Through the modified 1986 policy, the Government assumed responsibility for providing support for implementing programs of educational transformation, reducing disparities, universalisation of elementary education, adult literacy, non-formal education and scientific and technological research. In addition it laid stress on vocational education as a distinct stream to prepare students for identified occupations in several areas of relevance, higher education involving UGC, Open University distance learning and technical and management education. It recognized the need to introduce greater flexibility in the course structure and design special programs, including non-formal ones, for the benefit of women, the economically and socially weaker

sections and the physically handicapped. The policy also emphasized the need to provide training in entrepreneurship and encourage students to consider "self employment" as a career option. Special efforts and resources required for improving the evaluation process and examination reforms, continuing education and development of teachers and decentralization were also identified with the recommendation that the outlay of expenditure on education should uniformly exceed 6% of the gross national income, which may go up to 10%. However, in actual fact, the expenditure on education including that by the Central and State Governments continues to hover around 4% of the national income.

3.3 Science and Technology Policy of 2003

The new science and technology policy document published in 2003, reemphasizes this sentiment in the preamble itself stating "The nation continues to be firm in its resolve to support science and technology in all its facets. It recognizes its central role in raising the quality of life of the people of the country, particularly of the disadvantaged sections of society, in creating wealth for all, in making India globally competitive, in utilizing the natural resources in a sustainable manner, in protecting the environment and ensuring national security". The objectives of the policy have been outlined as:

- To educate, inform and enable all citizens to participate fully in the development of science and technology and its application to human welfare by integrating science and technology fully with all spheres of national activity.
- To ensure food, agricultural, nutritional, environmental, health and energy security of the people on a sustainable basis.
- To mount a direct and sustained effort on alleviation of poverty, enhancement of livelihood security, removal of hunger and malnutrition, reduction of drudgery and regional imbalance and generation of employment, by using scientific and technological capabilities along with our traditional knowledge power.
- To vigorously foster scientific research in universities and other academic, scientific and engineering institutions and also build and maintain centers of excellence.
- To promote the empowerment of women, in all science and technology activities and ensure their full and equal participation.

- To provide necessary autonomy and freedom in all R&D institutions to foster creativity.

- To ensure national security using latest scientific and technological advances.

- To encourage research and innovation in all areas of relevance for the economy and society, by promoting close and productive interaction between private and public institutions in all key areas of science and technology and leveraging new technologies such as information technology, bio-technology and materials science and technology.

- To strengthen enabling mechanisms relating to technology development, education, absorption and upgradation from concept to utilization.

- To establish Intellectual Property Rights (IPR) regimes to protect intellectual property and promote speedy and effective commercialization of such inventions.

- To ensure high-speed access to latest information at affordable costs.

- To take steps to prevent and mitigate natural hazards.

- To promote international science and technology cooperation towards achieving the goals of national development and security and make it a key element of our international relations.

- To integrate scientific knowledge with insight from other disciplines and ensure fullest involvement of scientists and technologists in national governance so that the spirit and methods of scientific enquiry permeate deeply into all areas of public policy making.

The implementation plan has specifically emphasized human resource development as follows: "The number of scientists and technologists, while being large in absolute numbers, is not commensurate with the requirements in quality and when measured on a per capita basis. The demand is bound to increase in the coming years with more intensive activities involving science and technology. There is need to progressively increase the rate of generation of high quality skilled human resource at all levels. This process would naturally entail reversing the present flow of talent away from science, by initiating new and innovative schemes to attract and nurture young talent with an aptitude for research, and by providing assured career opportunities in academia, industry, Government or other sectors. In order to encourage quality and productivity in science and technology, mobility of scientists and technologists between industry, academic institutions and research laboratories will be ensured".

3.4 Changing Industrial Scenario

Before independence, the demand for engineers was mostly for civil engineers and the most critical requirement was for designers and constructors of large irrigation projects. However, the largest numbers were engaged only in maintenance, whether it was in civil, electrical or mechanical engineering. After independence, a small but significant demand was created for design/development engineers by the Atomic Energy Commission, CSIR laboratories, defence organization, Department of Space and their offshoots. The demand for designers of large irrigation projects also increased substantially.

During this period, the IITs and a few other high quality institutions trained a significant number of youth to global academic standards. For most of them, there were few opportunities to utilize their knowledge and skills either in industry or in the government because till almost 1990, 85 % of post-matriculate employment was in the public sector where seniority counted more than merit. For these reasons large numbers of our best engineering talent migrated abroad.

Since 1990, IT industry has expanded explosively; large number of firms sprung up to supply compute professionals to foreign businesses, particularly in the Silicon Valley. However, most of them were at a relatively low technological level, described by many as computer coolies or techno-coolies. In any case during this period, a significant shift in employment took place, from the public to the private sector. Since the year 2000 Indian industry started changing its strategy from manufacture-based on imported know-how and imported equipment to manufacture based on local designs and locally produced machinery. Indications are that India is on the threshold of meeting global challenge in pharmaceutical, automobile, construction, and of course softwar technologies. Capital goods industry too has developed significantly. Hence, the engineers of the future will b increasingly employed in the private sector engaged more in design, erection, and production than in maintenance

In discussing perspectives of technical education it is important to carefully examine the changin employment scenario over the two decades since enunciation of the Technology Policy Statement. Some o the broad indicators of the changing scenario are:

- The absolute number of employment opportunities for technically qualified persons has increase considerably over the period. They are also more diversified. However, the societal demand f technical education, based on the perception of a rewarding career thereafter, has risen much fast than the real demand for technical persons by the economy. Pressures generated by this social perceptio

have led to a rapid expansion of supply of technical personnel, far in excess of the absorptive capacity of the economy, leading to under-employment and even unemployment of graduates and a deterioration of their real-income levels. It has also led to a degree of substitution, whereby, in many cases, degree holding engineers are taking up employment opportunities that could have gone to the diploma holders. The combined rate of unemployment and under-employment is sufficiently high to become a matter of serious concern to planners of technical education.

- Employment in the primary sector has been declining steadily. Large negative employment elasticity in the primary sector would mean that overall employment opportunities would continue to shrink even if the GDP contribution of the sector rises. However, given the increasing possibility of technological up-gradation of primary sector activities and the larger participation of organized sector in these activities, new employment opportunities would become available to the technologically qualified persons in the primary sector. These opportunities need to be estimated carefully to tailor, both qualitatively and quantitatively, the technical education programme.

- Manufacturing, the traditional user of technical manpower, does not exhibit an ability to provide significantly expanded employment opportunities for technical persons. The growth of the manufacturing sector has been largely job-less, due to its low employment elasticity, almost close to zero. Technical education system, accordingly, should desist from expanding supply in vocations related to manufacturing. New employment opportunities will indeed arise in manufacturing if the manufacturing sector grows, but the numbers needed in foreseeable future would be relatively small.

- Service sector is emerging as the area of significant employment growth. Not only is the sectoral GDP growth rate relatively high, it also benefits from healthy and positive employment elasticity values. Furthermore, indications are that the relative proportion of knowledge intensive service sector will rise over time - thereby expanding comparatively lucrative employment opportunities for the products of technical education system. The technical education system would do well to examine the implications of this shift and restructure its educational offerings accordingly.

- Compared to the past, employment opportunities would be more sensitive to the quality of the graduates. In an internationally competitive environment, it is the quality and not numbers that would matter. Graduates of sub-standard programmes and institutions will find it increasingly harder to get employment even if they are prepared to sacrifice on the income level.

- Past pattern of long employment in a particular enterprise or even in the same industry is beginning to break down. Ability to keep up-to-date with changing knowledge and skill requirements in the wake of frequent technological restructuring and making significant lateral shifts across disciplines, would be crucial for remaining employed. The implication for the technical education system is two-fold (i) the pedagogy should focus relatively more on the development of higher-order, generic, transferable skills and autonomous learning strategies and (ii) more opportunities for non-formal education and training, continuing education and training and distance-education should be offered by the system. The AICTE, accordingly, will need to change the nature and relative thrust of its activities.

- In future, securing, maintaining and growing in employment will demand both technological and managerial skills. A balanced development of technology and management education is needed to address the future employment needs.

In order to achieve desired results, the Indian technical education system needs to re-invent itself to meet this changed environment. It can do so only if it interacts more closely with industry and industry too takes a greater interest in the operation of India's technical education institutions. Such close interaction will occur if educational institutions induct industrial experts into their teaching programmes and pave the way for retired senior engineers to teach, securing thereby useful contacts and mutual interaction. Likewise industry too should, in its own self interest, open its doors, fund design projects, offer internships and engage in more intimate dialogue with technological institutions. In short, industry and education should cease to be two separate castes.

3.5 Future Vision of Technical Education

As noted in the preamble of the NPE, "education has continued to evolve, diversify and extend its reach and coverage since the dawn of human history. Every country develops its system of education to express and promote its unique socio-cultural identity and also to meet the challenges of the times". The AICTE, which has been given the task of promoting qualitative improvements of technical education in relation to planned quantitative growth and regulation and proper maintenance of norms and standards in the technical education system, has to develop an appropriate perspective and a forward looking vision for planning coordinated development and management of technical education in the country. The guiding considerations as stated in the 1986 NPE were :

a) Evolving a long term planning and management perspective of education and its integration with the country's developmental and manpower needs;

b) Decentralization and the creation of a spirit of autonomy for educational institutions;

c) Giving pre-eminence to people's involvement, including association of non-governmental agencies and voluntary effort;

d) Inducting more women in the planning and management of education; and

e) Establishing the principle of accountability in relation to given objectives and norms.

Perspective of technical education has also to be necessarily consistent with the aims and objectives of the science and technology policy resolution of 2003, which has been formulated by a large number of academics, thinkers, educationists, industry experts and policy makers. The committee recognizes that the AICTE is the primary body entrusted with the responsibility for human resource development in all technical areas and disciplines, for providing direct inputs to industries, national institutes, academic organizations and other societal needs of the country in terms of qualified manpower, research and development and management. The term "Technical Education" in this report includes programs of education, research and training in engineering, technology, architecture, town planning, management, pharmacy and applied arts and crafts as defined in section 1(g) of the AICTE Act, 1987. The structuring and development of technical education has to be consistent with international standards, if the graduates coming out of our institutions have to compete globally. The AICTE has to therefore necessarily transform itself and rapidly gear its activities to fulfill its mandate by taking all necessary actions to improve its performance and functioning.

The committee believes that any reforms or changes to be initiated by the AICTE to improve its performance and enable it to play its assigned role must flow from its own vision, consistent with the directions, aspirations and policy decisions enumerated in the nation's science and technology policy resolution. The committee, therefore, would first like to reiterate the AICTE vision :

"The AICTE should be a world class, technological organization leading technological and socio-economic development of the country by enhancing the global competitiveness of technical manpower and by ensuring high quality technical education to all sections of the society".

The present mission of the AICTE, in order to realize its vision as stated above, needs to be modified. Consistent with the Science and Technology Policy resolution of 2003 the AICTE mission should:

- Ensure highest quality of technical education, standards and norms, comparable to the best institutions anywhere in the world at diploma, undergraduate, post-graduate and doctoral levels in all the institutions, to enable India to become a global knowledge powerhouse.
- Promote integrated technical management and education to generate high quality innovators, technical experts, and managers with entrepreneurial skills, who can compete in the global market.
- Support and nurture high quality research and training at post graduate and doctoral levels in selected institutions.
- Promote human resource development to adequately meet the requirements of quality education and training in all the institutions.
- Encourage, assist and support technical institutions to establish better linkages with high quality academic institutions, research establishments and industries for carrying out their own research, training students and finding suitable career placements for them.

3.6 Role of the AICTE

In order to fulfill its role in accordance with its own vision and the statement of national requirements as elaborated in the Science and Technology Policy Resolution of 2003, the AICTE must necessarily strengthen and enlarge its role considerably.

These include but are not limited to:

1) Reliable and timely assessment and prediction of manpower requirement at the diploma, graduate and postgraduate levels in different disciplines of technical education as defined in section 1 (g) of the AICTE Act which includes all branches of engineering, technology, architecture, town planning, management, pharmacy and applied arts and crafts.

2) Strict control in the approval of new institutions, particularly in areas where the number of established institutions is already too large.

3) Coordinate the development of technical education in the country at all levels.

4) Production of model syllabus in all subjects and arrangements to update them once in two years to avoid obsolescence.

5) Ensure timely rigorous and speedy processing of accreditation and strict application of accreditation criteria, which must be made mandatory. Take severe action including de-recognition of those institutions, which do not meet the required standards.

6) Careful and strict scrutiny for granting deemed and autonomous status to institutions and rigorous periodic reviewing, once in five years, for the continuation of deemed status.

7) Timely assessment of faculty requirements of the recognized institutions and taking advance actions to develop the required quality faculty for meeting the basic needs of these institutions.

8) Close monitoring of global developments in technology and technical education to reorient our own national programme, as and when required and ensure our competitiveness in the globalised world. The AICTE should initiate a programme for this purpose.

9) Proactive encouragement of institutions to continually upgrade their facilities and carry out high quality research through substantially increased funding of various schemes already adopted by the AICTE.

10) Take all necessary steps to prevent commercialization of education.

11) Encourage institutions to forge strong interaction with industries and other academic institutions, by co-opting experts from such institutions as adjunct professors, initiating joint research projects and using industry facilities for training and research of both students and the faculty.

12) Establishing a strong Intellectual Property Rights Cell within the AICTE and at least in some selected major institutions for the benefit of all institutions under the purview of the AICTE.

13) Establishing cells in each of the institutions for assisting students in career counseling, industry interaction, job placement and advise them on training opportunities and entrepreneurship opportunities.

14) Forging of better coordination with UGC, Universities, academic organizations, research institutions and industries for carrying out the above tasks and streamlining procedures of approval, accreditation, etc. for rigorous but speedy implementation jointly with these organizations, wherever possible, to avoid duplication of functions.

15) Establishment of a few model Technology Business Incubators at selected places, around major technical academic and industrial institutions to develop entrepreneurship and contribute to the economic development of the nation.

16) Rewarding high quality training, research, invention, performance, leadership qualities etc., by instituting appropriate awards.

17) Encouraging institutions to forge close relationship with well known, high quality academic institutions abroad through active collaboration, joint academic activities including research, training and exchange of short term as well as long term visits of faculty members.

18) Extensive use of distance education facilities using both VSAT's and World Space Receivers for providing interactive education in all disciplines on a nation wide scale.

In order to carry out these tasks, the details of which are elaborated in the following chapters, the AICTE needs to reorganize itself substantially. The AICTE needs to enhance its own strength, both at the headquarters and at regional levels and also a substantive portion of the personnel needs to be employed on a permanent basis to provide continuity. The AICTE must decentralize its powers by giving greater autonomy to the regional offices. It must establish standing councils and boards in different disciplines for: periodically updating the curricula; providing advise on academic matters including research projects, standards and norms; act as peer review groups to critically assess quality of teaching, training and research; and advise on the emerging frontier areas of science and technology to enable the AICTE to take appropriate action in promoting such areas.

CHAPTER 4

PERFORMANCE REVIEW OF AICTE FUNCTIONING / ACTIVITIES

(Including Critical issues affecting Technical Education)

The establishment of the All India Council for Technical Education (AICTE) in 1987 through an Act of Parliament (No.52 of 1987) to take over the Planning, Organization and Administration of Engineering Education in India, was undoubtedly a great step forward which has been warmly welcomed by the Technical Education Community and Industry at large. The AICTE has indeed done a creditable job in establishing a set of norms and standards for the growth of technical education in the country and creating quality consciousness. Although, much has been achieved over the last 15 years, much more can be achieved with proper appraisal and support during the coming years. The AICTE gets actively involved right from the starting of institutions till the graduates and postgraduates pass out. Section 10 of the AICTE Act lists 22 functions for the AICTE. While the AICTE had to naturally prioritize its functions due to infrastructural, financial and social constraints, it is obvious that the AICTE needs to be well supported and strengthened to enable it to fulfill its mandate, particularly in the dynamic globalized environment of the new information age. In this chapter, we critically review the functioning and activities of the AICTE, with a view to suggest further improvements in its functioning and make suitable recommendations to transform the AICTE into a dynamic organization for promoting and nurturing world class technical education in the country.

4.1 Planning and Coordinated Development

4.1.1 National Forecast of Technical Manpower (Sec. 10(a) of the AICTE Act)

An accurate forecast of technical manpower requirement in various disciplines is extremely important to plan for an orderly growth of institutions and their geographic distribution. A fast changing and dynamic environment, an imperative need to successfully compete in the global market and the necessity to avoid becoming victims of technological obsolescence demand that the AICTE should be extremely alert and be prepared to cope with the rapidly changing market forces. Since engineering degree education is of four years duration, which is a long time in a rapidly changing environment, there is always a lag between the need forecast

prediction and the availability of technical personnel. Consequently accurate long and medium term forecasting of the number of technical people required in different disciplines is not an easy task.

Oversupply of technical personnel can lead to unemployment and underemployment, both of which represent the loss of public and private investment as also heavy opportunity cost on the students. This can also depress the relevant profession for years to come since the related education will not attract high quality students. Equally, undersupply can be dangerous inasmuch as it limits the country's potential of economic growth and restricts students' opportunity for pursuing profitable and satisfying careers. Manpower planning must therefore necessarily enter into decisions relating to establishment of new institutions and creating supply of different categories of technical manpower. In projecting the demand, each state government has to take into account its future plans for economic and industrial growth as also the most likely scenario that would obtain. Further, considering that technical manpower can and does move across State boundaries for purposes of employment as well as education, a State's manpower planning should also take into consideration the overall national picture of demand and supply. Manpower planning is further complicated by the aspirations and consequent social demand for technical education presented by the students and their parents. In addition, manpower supply is distorted by the excessive commercial push from the private and foreign institutions. States also feel some compulsion to provide a certain amount of technical education opportunities which are related to the number of students graduating from the relevant qualifying levels – secondary or higher secondary, as the case may be. Yet another factor that enters into consideration is the political need to support the developmental aspirations of relatively backward areas and special groups of population.

In spite of the inherent difficulties involved in manpower projection, several attempts and studies have been made by different organizations (McKinsey, NASSCOM, etc.) to predict technical manpower requirement, even though assumptions made in these studies have turned out to be not totally correct. The growth of national GDP and the infrastructure facilities have certainly lagged behind the predictions, which were based on optimistic assumptions. While there has been an explosive growth in the number of technical institutions in the country particularly during the last decade, non-availability of qualified faculty in required numbers, inadequate infrastructural facilities combined with slower economic growth, industrial recession and the geopolitical situation have resulted in a large number of engineers unable to find gainful employment.

For attaining a match of demand for and supply of any category of technical manpower, the exercise has to be undertaken preferably in a segmental manner using an individual state as the unit. The National Technical Manpower Information System (NTMIS), operated by the Institute of Applied Manpower Research (IAMR)

has been carrying out the task of manpower projection on a State-wise basis, during the last few years. NTMIS is designed to provide for different categories of technical manpower, information on the level of unemployment, average salary levels (which can be a proxy measure of underemployment), migration across State boundaries as also international migration, employment patterns by the nature and size of organization, career, growth prospects in certain types of organizations and, the size and patterns of future demand on alternate scenarios. NTMIS data has been criticized often for not being up-to-date. Despite certain limitations and scope for improvement, it is a sad fact that the considerable amount of valuable information generated by the NTMIS has never been used either by the States or the AICTE. [The limitations of the NTMIS are projected more as an excuse for not using the information, rather than making a serious demand for more and better information and then using it in decision making.] If the AICTE and the States had chosen to utilize the NTMIS information for real decision making, it would have generated pressures for needed improvements in the functioning of the NTMIS. The present criteria for judging placement of technical manpower is based on engineers getting a job within two years after their graduation which necessarily means a delay of at least three years in its publication. The committee recommends that the duration be reduced to 2 years since an engineer sitting idle and not getting a job within eighteen months of his graduation is unlikely to get a suitable job afterwards.

For the purpose of granting approval to proposals for new institutions or programmes or altering intake in existing programmes, the State Government and the AICTE should agree to utilize manpower planning as a key factor. Manpower planning should be based primarily on the perspective of manpower demand and supply within the State as well as nationally and adjusted within small limits, to the special requirements of legitimate social and political considerations. Proposals, which are not consistent with this perspective, should not be recommended by the State Government nor approved by the AICTE. The technical manpower forecasting and information system must be extended to all the disciplines which come under the purview of the AICTE including diploma holders, graduates, PG's and Ph.D in pharmacy, hotel management, architecture and town planning, management and applied arts. The certificate level education should also be taken for the purpose of manpower plans.

In order to arrive at an agreed manpower plan for each State:

a) NTMIS should hold regular meetings with the State officials, present their data and analysis, ascertain further needs of the State in this regard and incorporate such needs in the work of NTMIS.

b) The AICTE should hold periodic meetings with the State Governments. At these meetings, the entire scenario of technical education in the State should be reviewed with regard to development needs as

well as facilities available. The meetings should lead to a convergence of views on future intake levels for various programmes of technical education in the State.

c) The State Government should

i. Provide a scenario of future demand and supply of technical manpower in the State based on NTMIS information and its own plans of industrial growth.

ii. Project special requirements, with due justification, on the basis of broad indicators/norms agreed to by the AICTE.

iii. Constitute State level committees involving representatives of State, the AICTE and NTMIS for making recommendations in the matters of approval of new institutions, and additional courses/ variation in intake to the AICTE.

In spite of the shortcomings inherent in any prediction, the committee strongly recommends that the AICTE must be substantially strengthened to generate and continuously update the database on the supply and demand of technical manpower at each regional level. The NTMIS should be backed by a stable system of a dedicated set of experts, not necessarily available in the present pattern of a funded project. NTMIS also requires to be supported by continuous research in manpower planning that would help to evolve and improve the current methodology. Further, NTMIS information needs to be disseminated widely and efforts need to be made to ensure that the State Governments, students, parents and employers, understand the labour market situation better, and stop unnecessary proliferation of new institutions.

Considering the importance of the NTMIS system, the committee strongly recommends the creation of a separate independent "Centre for Human Resource Information System" (CHRIS) funded by the AICTE to carry out the task comprehensively and systematically. Unbiased information provided by an independent center such as CHRIS is essential for enabling the AICTE to discharge its statutory responsibility mentioned in Section 10(4) namely "Undertake survey in the various fields of technical education, collect data on all related matters and make forecast of the needed growth and development in technical education"

4.1.2 Growth of UG Education

There has been a phenomenal increase in the number of institutions and in the intake of students at graduate level after 1990 due to the mushrooming growth of private, aided as well as self-financing institutions

particularly in engineering, computer application and business management disciplines. This explosive growth has been mostly in the South, South West and Western regions creating geographic inequity in the growth of technical institutions in the country. The total number of Degree Engineering Colleges practically doubled in the decade 1980 to 1990, from around 158 institutions to over 337. During the decade of 1990 to 2000, it increased from 337 to over 776, three quarters of which were self-financed. Today there are 1208 engineering degree colleges including 986 self-financing institutions with a total intake of over 3.5 lakh students. Equally spectacular has been the growth in MCA and MBA Degree Institutions, which now number 1006, and 930 with an intake of over 53,000 and 64,000 students respectively. The growth in Pharmacy, Architecture and Hotel Management (HMCT) follows the same trend, even though not as spectacular as that in Engineering and Management Institutions (Tables 4.1, 4.2 and 4.3 and Figures 4.1, 4.2 and 4.3). In spite of the number of vacant seats ranging 5% to 25% depending on the discipline, region and institution, the mushrooming growth continues to go on due to the maneuvering by political/social heavy weights in each region.

While the faculty to student ratio is generally poor in all institutions, it is particularly bad in many of the newly created ones because of non- availability of adequately qualified teachers. Combined with the poor infrastructure, most of these institutions are churning out poorly equipped graduates, who not only remain unemployed for a considerable period of time but also are generally not even employable. As per the NTMIS report, more than 5% of the 1998 batch of engineering graduates remained unemployed even after 2 years of completion of their degree. In certain disciplines, particularly the classical disciplines of Civil, Mechanical and Electrical Engineering as also MBA and MCA, the percentage of unemployed is considerably greater than the average. According to recent estimates, the unemployment rate of engineering degree holders exceeds 20%. In spite of the past record, the intake in engineering has doubled over the last three years and when these graduates come into the market the situation could become critical. This will only lead to severe frustration among the young graduates, and unless drastic measures are taken to improve the faculty position, training and infrastructure in the technical institutions, the unemployed graduates will no doubt become willing partners of anti-social groups.

The committee recommends a much stricter control in giving further approvals to new Institutions especially in the South, Southwest and Western Regions, to slow down further proliferation of such institutions. As elaborated in Chapter-9, even for a sustained economic growth rate of 8% per year, the country can at best support 4-5% growth in the technical personnel, as against the current 15-20% annual growth rate in the intake of undergraduate technical students. The committee, therefore, strongly recommends that no further expansion of UG technical institutions should be allowed and approvals for new institutions should be stopped

Table 4.1 : GROWTH OF DEGREE/DIPLOMA INSTITUTIONS AND SANCTIONED INTAKE IN ENGINEERING IN POST-INDEPENDENCE ERA

Year	DEGREE		DIPLOMA	
	No. of Institutions	Intake	No. of Institutions	Intake
1950	50	3700	46	4200
1960	110	16000	195	26500
1970	145	18200	309	43500
1980	158	28500	332	49200
1990	337	66600	879	122000
2000	776	185758	1215	211894
2003	1208	359721	1197	242698

Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Table 4.2 : GROWTH OF TECHNICAL EDUCATION INSTITUTIONS SINCE 1990

Year/Programme	1990	1995	1997	1998	1999	2000	2001	2002	2003
Degree (Engg)	337	375	471	558	662	776	838	1057	1208
Degree(Pharmacy)		128	164	184	197	230	237	274	294
Degree(Arch.)		91	94	93	93	103	107	107	108
Degree(HMCT)		7	12	22	28	36	38	40	43
MBA		312	508	584	647	712	749	819	930
MCA			146	224	310	494	553	865	1006

Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Table 4.3 : GROWTH OF SANCTIONED INTAKE IN TECHNICAL INSTITUTIONS SINCE 1990

Year/Programme	1990	1995	1997	1998	1999	2000	2001	2002	2003
Degree (Engg)	66600	90773	114991	135784	156343	185758	226560	293804	359721
Degree(Pharmacy)		5930	8100	8855	9657	11725	12341	13941	15415
Degree(Arch.)		3827	3947	3755	3755	4642	4155	3972	3560
Degree(HMCT)		420	650	1085	1425	1875	1960	2100	2205
MBA		26874	45308	49638	53667	57977	60224	65102	64403
MCA			4627	6987	10029	17395	24747	40797	53256

Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 4.1 (a) : GROWTH OF DEGREE-DIPLOMA ENGINEERING TECHNICAL INSTITUTIONS SINCE 1990

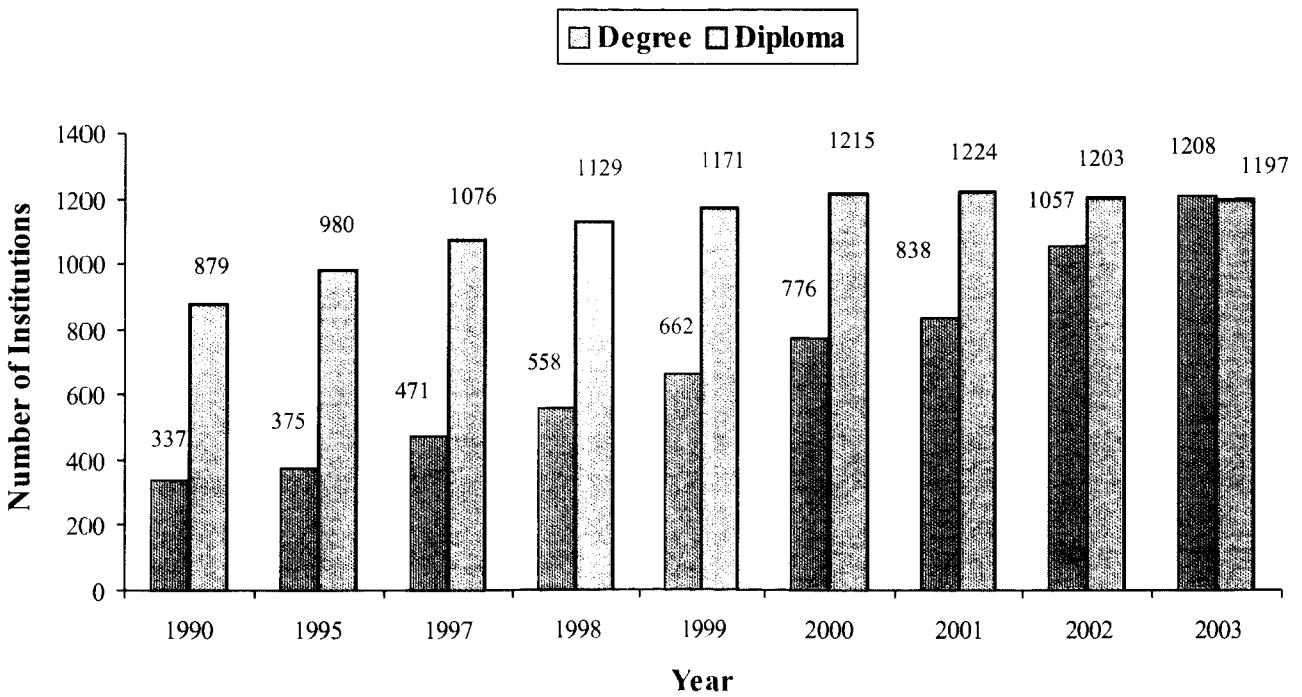
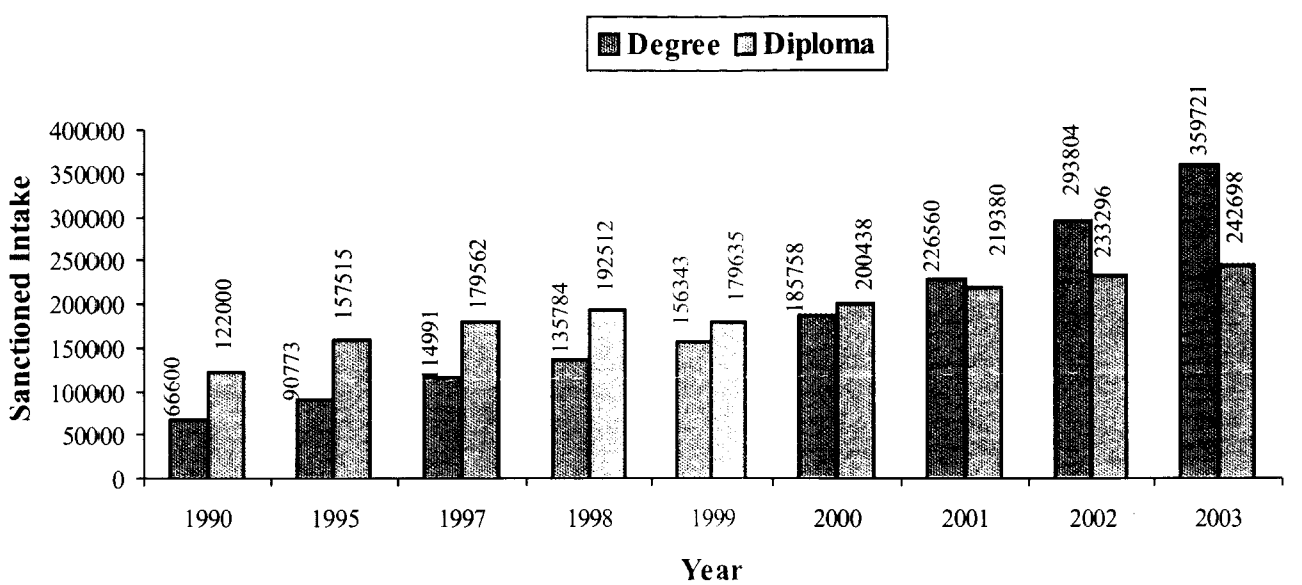


Fig. 4.1 (b) : GROWTH OF SANCTIONED INTAKE IN DEGREE-DIPLOMA ENGINEERING TECHNICAL INSTITUTIONS SINCE 1990



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 4.2 (a) : GROWTH OF DEGREE TECHNICAL INSTITUTIONS IN PHARMACY, ARCHITECTURE, HMCT SINCE 1990

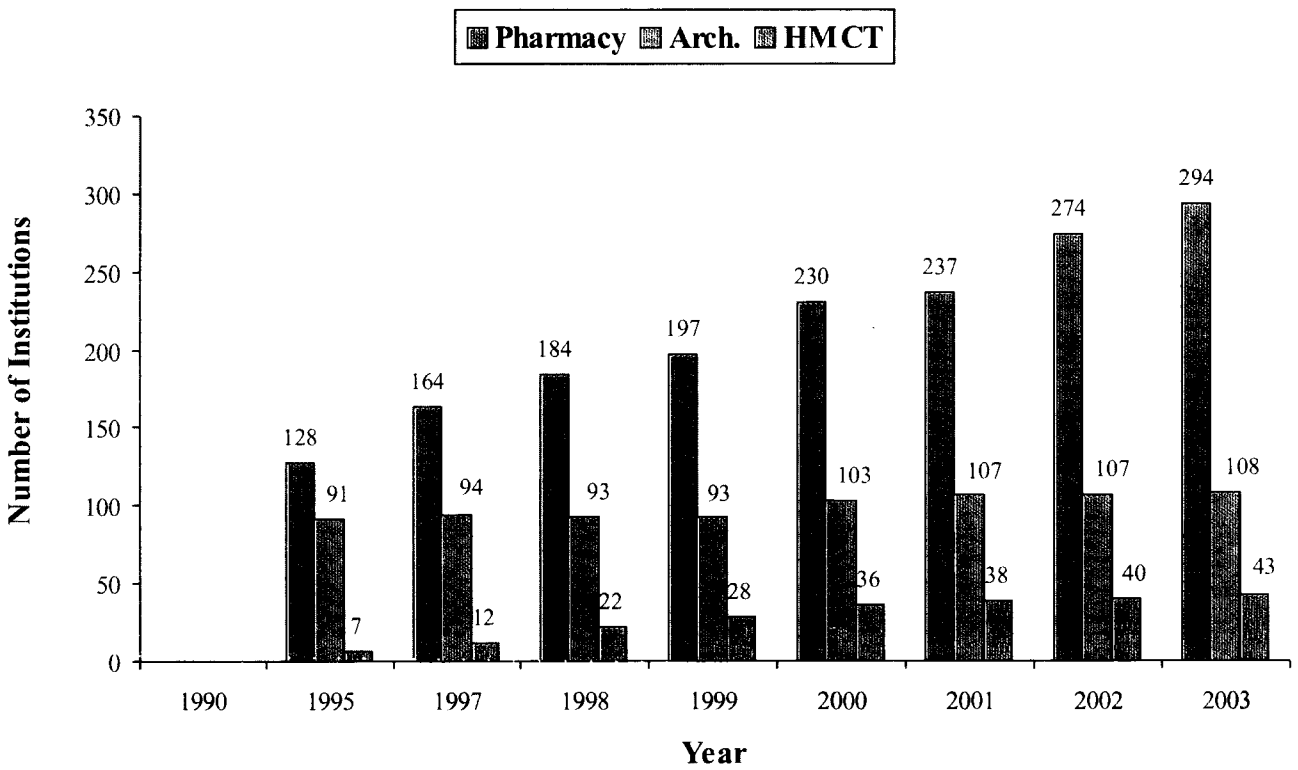
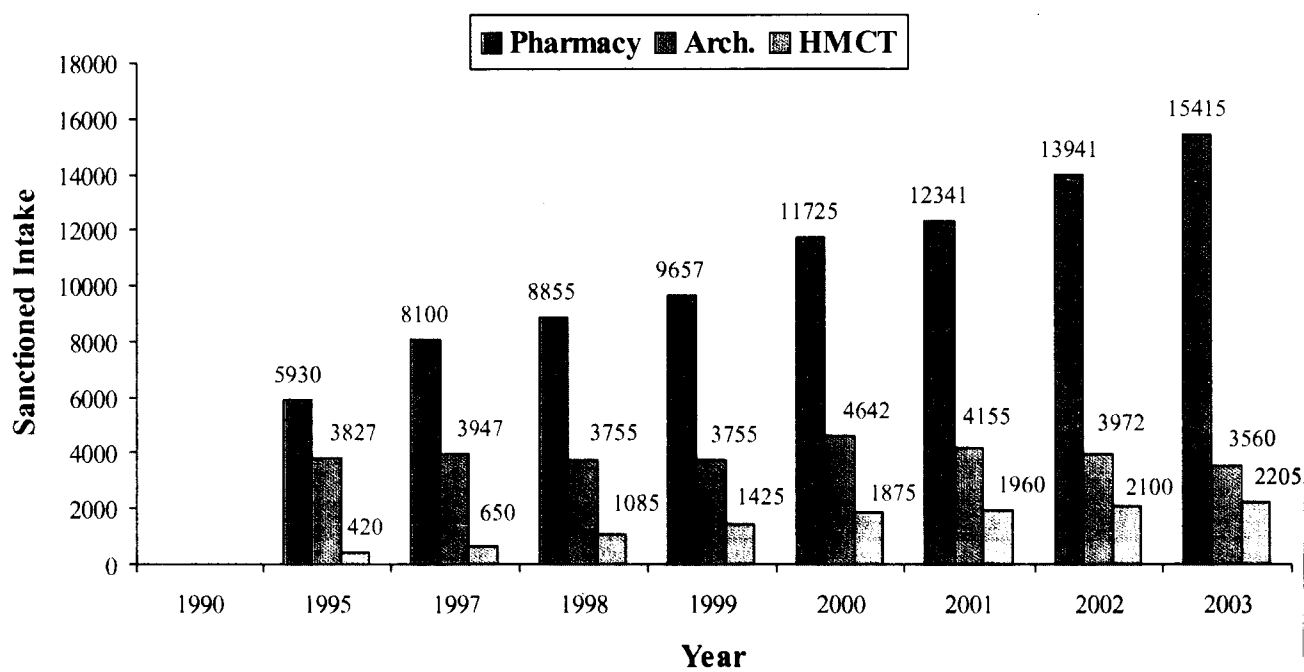


Fig. 4.2 (b) : GROWTH OF SANCTIONED INTAKE IN DEGREE TECHNICAL INSTITUTIONS OF PHARMACY, ARCHITECTURE, HMCT SINCE 1990



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

Fig. 4.3 (a) : GROWTH OF DEGREE TECHNICAL INSTITUTIONS IN MCA-MBA SINCE 1990

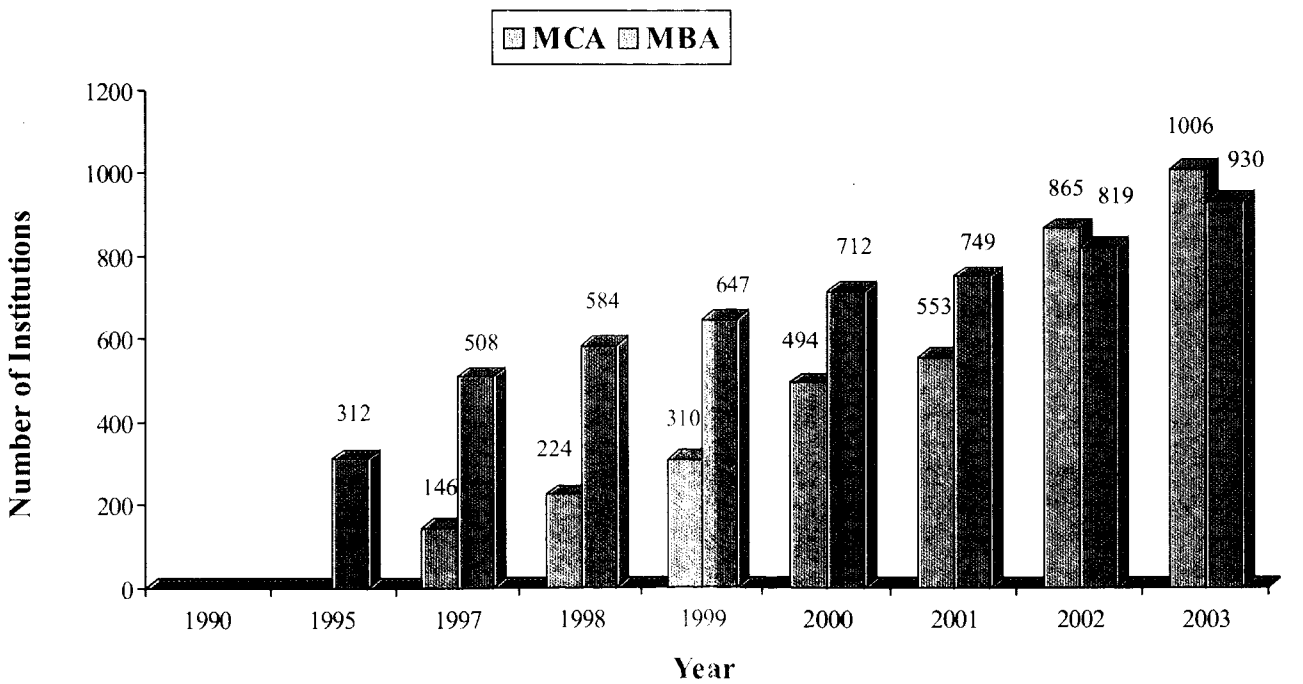
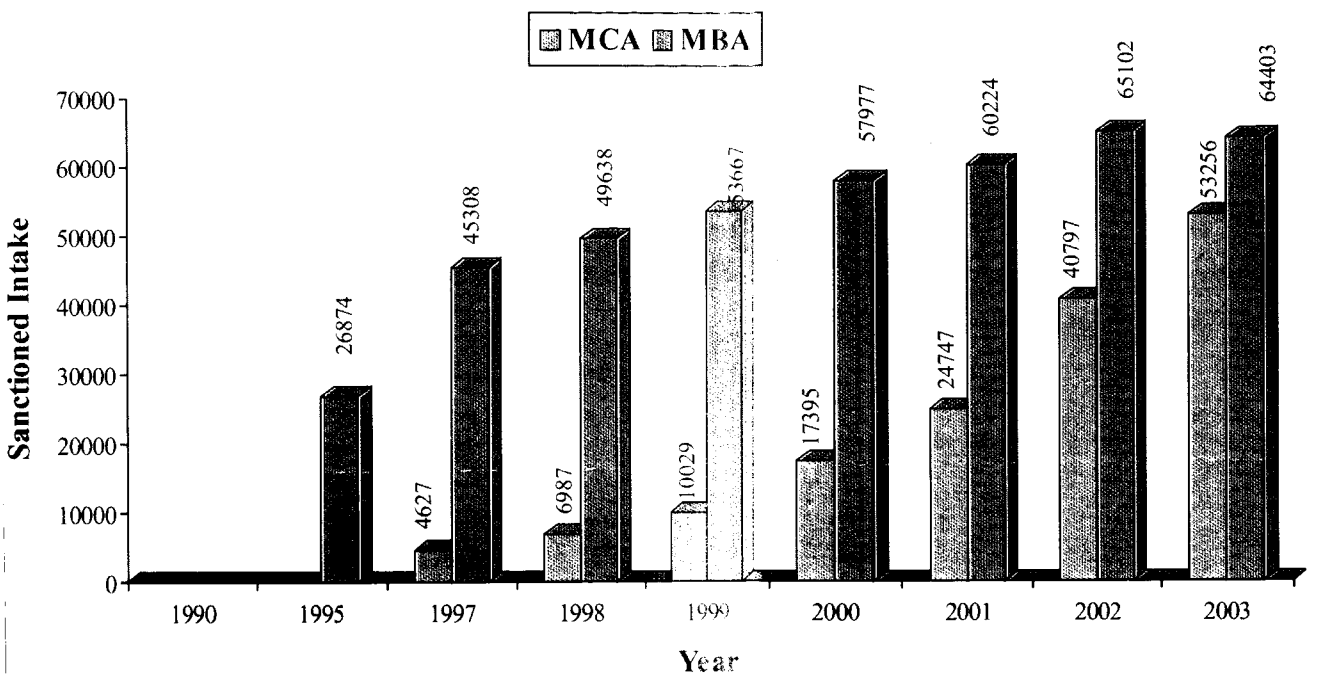


Fig. 4.3 (b) : GROWTH OF SANCTIONED INTAKE IN DEGREE TECHNICAL INSTITUTIONS OF MCA-MBA SINCE 1990



Source: (i) Technical Education in Independent India 1947-1997 (ii) The AICTE Annual Reports

for a period of at least 5 years, in states where the student intake for UG technical education exceeds the national average of about 350 per million population. As expected, it is these States, which have a very severe scarcity of qualified faculty, which justifies the suggested bold step. This will not only improve the quality of existing institutions by enabling the AICTE to provide better support and prevent the social unrest that can ensue from unemployment of qualified technical personnel but also indirectly assist in promoting the establishment of quality institutions in areas / States suffering from severe scarcity of technical institutions.

4.1.3 Growth of PG Institutions

The number of recognized institutions offering postgraduate education in Engineering and Technology (ME / M.Tech), which was just around six prior to 1947, has now reached 321 in 2003. 1552 PG programmes in hard-core engineering have now been recognized with a total sanctioned intake of over 26,000 candidates (Figures 4.4 and 4.5), even though the present annual outturn of PG's is just around 8,000, a poor 30% of the actual intake.

There is an acute shortage of faculty for imparting postgraduate education as discussed in Section 4.2 in detail. The committee is strongly in favour of starting 5 year integrated M.Tech programmes in selected high quality institutions after 10+2. The candidates selected for such integrated programmes could be given a scholarship or stipend of Rs.5,000/- per month during the first three years to be raised to 10,000 during the last two years, to attract the best students to go in for integrated M.Tech., provided they bind themselves to be in the teaching profession for at least three years. The AICTE may have to evolve an arrangement under which institutions that are not able to fill the posts of lectures should be obliged to recruit graduates of integrated M.Tech. programmes to the extent they are available. An expenditure of just around Rs.10 Crores is all that is required to develop 200 PG teachers a year. Existing TTTI's, with a minimal support, can also be encouraged to start integrated M. Tech Course.

The number of Ph.D's in the engineering disciplines coming out of Indian institutions is just about 375 per year, 80% of which is from IIT's, IISc., Bangalore, and a small number of selected universities. In the fields of Business Management, Hotel Management, Architecture and Town Planning, Pharmacy and Applied arts, the availability of Ph.D's is practically negligible. It is obvious that even the highly conservative estimated requirement of over 10,000 Ph.D's in the next 3-4 years to meet the requirements of UG and postgraduate education can in no way be met from the existing institutions and hence novel ways have to be adopted to ensure the availability of qualified faculty to the vast number of recognized AICTE institutions.

Fig. 4.4 : GROWTH OF PG ENGINEERING INSTITUTIONS AND COURSES SINCE 1990

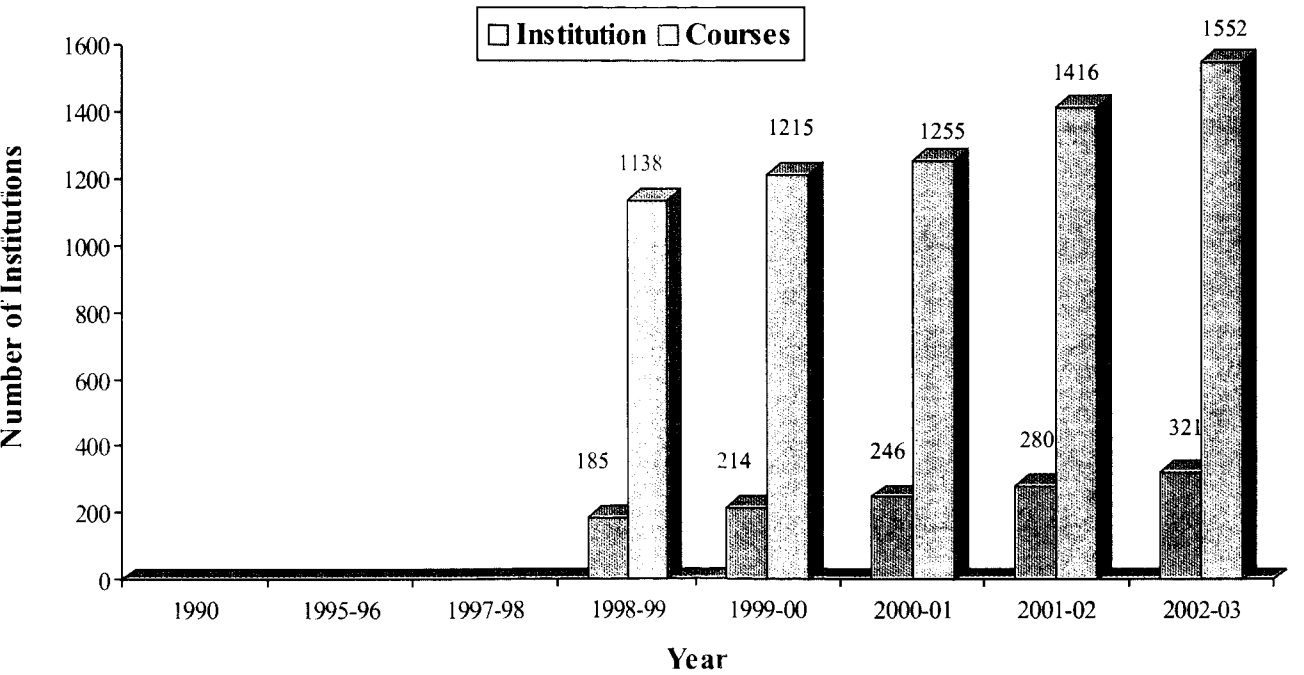
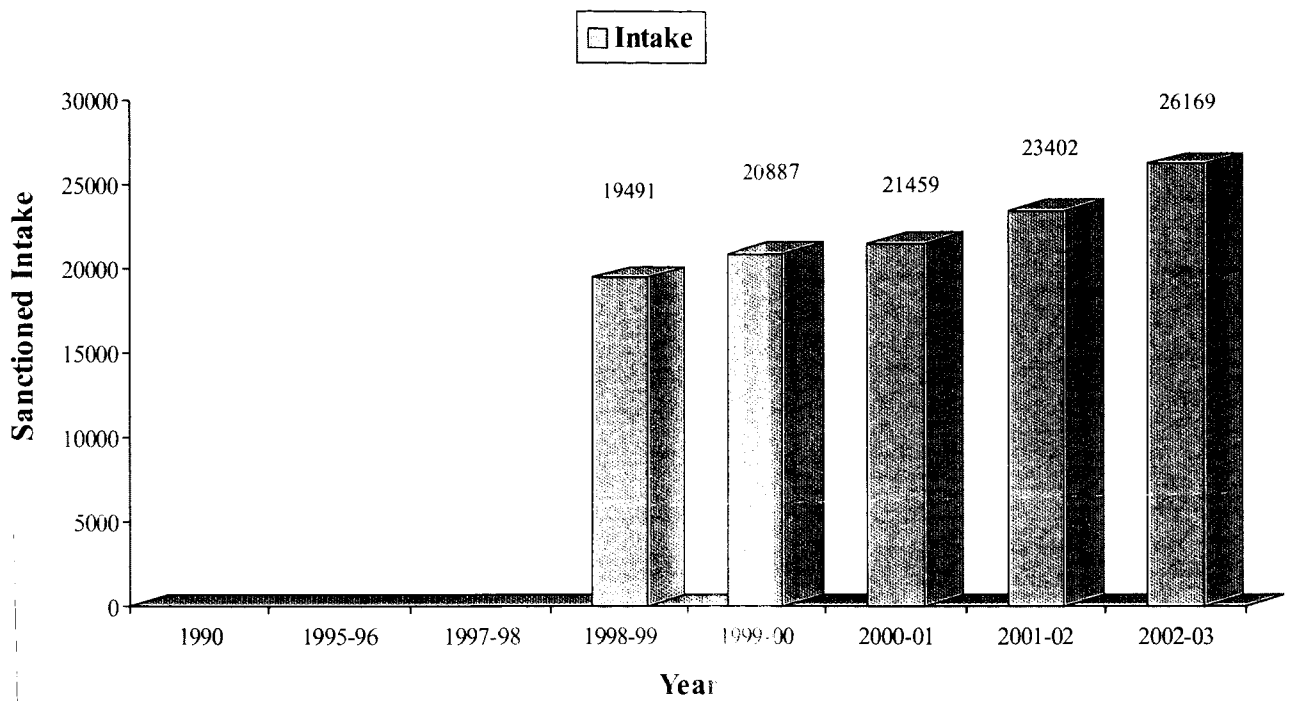


Fig. 4.5 : GROWTH OF SANCTIONED INTAKE IN PG ENGINEERING INSTITUTIONS SINCE 1990



Source: AICTE Records

Thacker Committee and Dr. Chandrakant reports in 1971 as well as the subsequent Nayudamma Committee report ten years later, have all stressed the need to maintain standards, provide better incentives for postgraduate researchers, accurate assessment of future requirements and winding up of outdated and irrelevant programmes. The 1999 Rama Rao Committee Report has also made several useful suggestions in this regard. Even though the AICTE has followed up some of these suggestions, it has not been able to attract bright engineers to take up postgraduate studies in view of the fact that PG engineers, who are primarily required in educational institutions, find themselves at a serious disadvantage as far as their emoluments are concerned, compared to the graduate engineers who join industries. The only way out of this predicament is to provide encouragement to the graduate/masters degree holders who join teaching profession to take up research towards their doctoral degree by granting additional incentives, facilitating their leave of absence and enabling them to carry out research at recognized institutions and guaranteeing better prospects after the acquisition of their doctoral degree. The Committee strongly recommends that the AICTE enhances the stipend and provides other amenities and incentives to the PG and Doctoral students, which must be at least comparable, if not better than what they could get had they joined service after their graduation. In order to attract truly bright students to join PG courses, the committee recommends enhancing the PG scholarship at regular intervals to match the total emoluments a freshly appointed graduate teacher would receive. The AICTE should then create a national pool of teachers in various disciplines, consisting of the above trained graduates along with those trained under the early faculty induction programme (see section 4.2.3), which must be viewed as an essential act for achieving public good. Wide publication of the list of pool teachers among all the institutions would not only enable the institutions to take advantage of it for their own recruitment, but also take away their excuse of not being able to find qualified teachers.

4.1.4 Approvals for Starting of New Institutions (Section 10 (k) of the AICTE Act)

Under the Act (Section 10 (k)), the AICTE has the statutory authority to grant approvals for starting technical institutions introduction of new courses and fixing the intake at all levels ranging from Diploma to Post graduation and Ph.D programmes. The AICTE has set procedures evolved over the years to give approval to new institutions to start UG and PG programs. These are detailed in "The AICTE Hand Book for Approval Process" (Academic Year 2003-04) for different programs. This well prepared and comprehensive legal document containing 14 Sections was published on November 25, 2002 in the Gazette of India, Extraordinary, Part II Sec.-4.

Even though the approval cycle and the procedure have been simplified, it still takes 8-12 months for giving approval to institutions after they submit their application along with approval letters from the concerned State Government and the affiliating University. The approval is based on well laid down norms and standards regarding the physical and infrastructural facilities, staff pattern and their classification 10 (i) In order to further simplify and expedite the approval cycle, the committee recommends that (i) regional committees be strengthened to ensure speedy assessment and most importantly (ii) explore the possibility of having joint appraisal along with the participation of the concerned University.

The Committee is of the firm opinion that any approval to start a new institution must be a two-step process. The first step may be based on the presently laid down criteria regarding physical assets and financial viability accompanied by a detailed project report, based on which "in principle" approval can be given for a two year period. The final approval for admission of students must insist on satisfactory establishment of laboratory and infrastructure facilities, computer networking system, library facilities and the teaching staff including their qualifications. In order to streamline the approval procedure and make it more rigorous, the Executive Committee of the AICTE had appointed a sub-committee under Prof. Ashoka Chandra in September 2000, to review the norms and standards on approval process. The report of Ashoka Chandra Committee, which was submitted in 2001, contains valuable suggestions, which have been formulated after extensive discussions carried out in 6 organized workshops in different parts of the country involving concerned organizations. The important recommendations of this committee are reproduced below:

1) Application for approval by the AICTE must necessarily be accompanied with a detailed project report (DPR) and a non-refundable processing fee. The period for processing the application should be specified by the AICTE.

2) DPR must outline the vision of the promoters and envisaged growth trajectory for the next fifteen years.

3) All new entrants must furnish an irrevocable bank guarantee valid for ten years. The guarantee amount must be Rs.1 Crore for engineering and technology institutions and Rs.40 Lakhs for others, which may be reduced to half the amount on completion of five years of working.

4) To bring a degree of uniformity in the inspection work, the AICTE should have an orientation programme for the empanelled experts at regional/State level.

5) Inspection by the AICTE should be carried out only when the institute declares it is ready, which must be within the stipulated period.

6) Institutes may start without total infrastructure in place as per year-wise norms. However, full space and facilities should be available by the time the first batch enters the final year.

7) Initial approval should be granted for two years only. Subsequent approvals may be for 5 years at a time, based on satisfactory performance.

8) While an annual report by the institute is adequate prior to the approval, detailed monitoring inspection is essential for getting renewal after the approval period.

9) Accreditation must be made mandatory and the AICTE must not hesitate to reduce the intake or even de-recognize institutions and revoke their approval, if the performance of the institutions is not satisfactory.

10) National testing service may be established to streamline admission procedure.

11) Student to teacher ratio should be 15:1, excepting in the case of Architecture and Town Planning where a ratio of 10:1 is recommended.

12) Faculty structure of 1:2:4 for professors, assistant professors and lecturers should be reached within 10 years of starting the institution, excepting in the case of architecture and town planning where ratio of 1:2:3 is recommended.

13) Continuous upgradation and modernization of libraries both in terms of acquisition of books and use of computerized management must be insisted upon.

14) Computer availability must be at least 50% of the student intake / enrolment in addition to those used in administration, library, etc.

The committee, after carefully reviewing these recommendations, endorses them and suggests rigid application of these to ensure that fly by night operators for commercial gains start no new institution. The committee also recommends the suggested ratio of professors to assistant professors and lecturers be used as a minimal guideline. In particular, at no time the student to teacher ratio should deteriorate beyond 20:

Flexible complementary scheme should be adopted to provide career growth to truly deserving scholars, which would necessarily increase the ratio of professors and assistant professors to lecturers in course of time.

4.1.5 Regional Inequity in the Growth of Technical Institutions

Data on the region-wise and State-wise distribution of institutions, and sactioned intake of students shown in Tables 4.4 - 4.8 and Figures 4.6 - 4.12 are very revealing. Table 4.8 also shows the State and region-wise distribution of degree engineering institutions and their intake per million population. They clearly bring out the highly non-uniform geographical distribution of institutions across the country with more than 52% of the institutions being located in South and South West, whereas East and North account for just around 7% and 10% respectively. While the four states in the South namely Tamil Nadu, Andhra Pradesh, Karnataka, Kerala and Maharashtra State account for 250, 215, 111, 73 and 151 of degree engineering institutions respectively, States like Bihar, Assam, Himachal Pradesh, North Eastern States, Jammu & Kashmir, Jharkand have less than 7 Institutions each. At the extreme end of the spectrum, Nagaland, Andaman and Nicobar, Daman & Diu have no technical institutions at all. Paradoxically, premier institutes like the IITs are clustered in North with only two IITs, one in Chennai and the other in Mumbai serving the entire region south of the Vindhyas.

Likewise 43% of MBA institutions and 59% of MCA institutions with an intake of 35% and 57% of students in the above disciplines are in the South and South West, almost equal to the total number of MBA and MCA institutions and their sanctioned intake in the entire region of the country covering Central, East, North and North Western areas. Similar is the case with Pharmacy and Architecture. In Hotel Management the regional inequity is so great that almost 50% of the institutions and intake is in the South West alone, that too in Karnataka, obviously as a result of the Udupi Hotel effect.

Table 4.4 (a) : REGIONAL DISTRIBUTION OF TECHNICAL INSTITUTIONS AS ON MARCH 31, 2003

Region	Engineering	MBA	MCA	Pharmacy	Hotel Management	Architecture	Total
Central	82	67	80	33	3	11	276
East	99	56	68	22	1	6	252
North	99	120	106	26	8	6	365
North-West	119	116	99	36	3	13	386
South	471	305	481	67	0	20	1344
South-West	184	95	114	55	18	18	546
West	154	171	58	55	10	34	482
Total	**1208**	**930**	**1006**	**294**	**43**	**108**	**3651**

Source: AICTE Handbook for Approval Process

Table 4.4 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN TECHNICAL INSTITUTIONS AS ON MARCH 31, 2003

Region	Engineering	MBA	MCA	Pharmacy	Hotel Management	Architecture
Central	25914	5390	4496	1725	90	410
East	24019	5149	3612	1160	60	145
North	26356	8995	6475	1405	405	192
North-West	32042	10895	5515	1800	150	516
South	145372	17025	24420	3717	0	715
South-West	58243	5561	5810	2898	980	490
West	47775	11388	2928	2710	520	1092
Total	**359721**	**64403**	**53256**	**15415**	**2205**	**3560**

Source: AICTE Handbook for Approval Process

Table 4.5 : STATEWISE LISTING OF UNDERGRADUATE DEGREE INSTITUTIONS AND SANCTIONED INTAKE AS ON MARCH 31, 2003

Region	State/Union Territory	Engineering		Pharmacy		HMCT		Architecture	
		NOI	Intake	NOI	Intake	NOI	Intake	NOI	Intake
Central	Madhya Pradesh	45	12970	18	970	2	60	4	130
	Chhatisgarh	12	3385	2	100	0	0	1	40
	Gujarat	25	9559	13	655	1	30	6	240
	Total ——>	**82**	**25914**	**33**	**1725**	**3**	**90**	**11**	**410**
East	Mizoram	1	120	0	0	0	0	0	0
	Sikkim	1	420	1	60	0	0	0	0
	West Bengal	45	10709	4	250	1	60	3	81
	Tripura	1	160	1	30	0	0	0	0
	Meghalaya	1	135	0	0	0	0	0	0
	Arunachal Pradesh	1	210	0	0	0	0	0	0
	Andaman & Nicobar	0	0	0	0	0	0	0	0
	Assam	3	720	1	20	0	0	0	0
	Manipur	1	150	0	0	0	0	0	0
	Nagaland	0	0	0	0	0	0	0	0
	Orissa	38	9505	11	620	0	0	2	44
	Jharkhand	7	1890	3	120	0	0	1	20
	Total ——>	**99**	**24019**	**22**	**1160**	**1**	**60**	**6**	**145**
North	Bihar	7	1575	3	75	0	0	1	22
	Uttar Pradesh	83	22491	19	1150	6	300	5	170
	Uttranchal	9	2290	4	180	2	105	0	0
	Total ——>	**99**	**26356**	**26**	**1405**	**8**	**405**	**6**	**192**
North-West	Chandigarh	3	580	2	110	0	0	1	40
	Haryana	33	9385	7	370	0	0	2	74
	Jammu & Kashmir	5	1245	0	0	0	0	0	0
	Delhi	13	3540	5	235	1	60	4	192
	Punjab	33	8875	12	530	1	60	2	60
	Rajasthan	29	7807	10	555	0	0	3	120
	Himachal Pradesh	3	610	0	0	1	30	1	30
	Total ——>	**119**	**32042**	**36**	**1800**	**3**	**150**	**13**	**516**
South	Andhra Pradesh	215	64300	29	1547	0	0	6	235
	Pondicherry	6	1950	1	30	0	0	0	0
	Tamil Nadu	250	79122	37	2140	0	0	14	480
	Total ——>	**471**	**145372**	**67**	**3717**	**0**	**0**	**20**	**715**
South-West	Karnataka	111	40385	49	2640	18	980	14	380
	Kerala	73	17858	6	258	0	0	4	110
	Total ——>	**184**	**58243**	**55**	**2898**	**18**	**980**	**18**	**490**
West	Maharashtra	151	47035	54	2650	10	520	33	1062
	Goa	3	740	1	60	0	0	1	30
	Daman & D,Dadar,N	0	0	0	0	0	0	0	0
	Total ——>	**154**	**47775**	**55**	**2710**	**10**	**520**	**34**	**1092**
	Grand Total	**1208**	**359721**	**294**	**15415**	**43**	**2205**	**108**	**3560**

)urce: AICTE Handbook for Approval Process

Table 4.6 : STATEWISE LISTING OF DIPLOMA INSTITUTIONS AND SANCTIONED INTAKE AS ON MARCH 31, 2003

Region	State/Union Territory	Engineering		Pharmacy		HMCT	
		NOI	Intake	NOI	Intake	NOI	Intakee
Central	Madhya Pradesh	47	7915	8	380	0	0
	Chhatisgarh	11	1655	1	30	0	0
	Gujarat	36	12411	11	610	0	0
	Total ——>	**94**	**21981**	**20**	**1020**	**0**	**0**
East	Mizoram	3	390	1	30	0	0
	Sikkim	2	270	1	60	1	60
	Nagaland	3	285	0	0	0	0
	Tripura	1	210	1	60	1	15
	Meghalaya	3	440	0	0	0	0
	Arunachal Pradesh	2	300	0	0	1	20
	Manipur	3	265	1	20	0	0
	Assam	10	1288	2	150	0	0
	Andaman & Nicobar	2	215	0	0	1	20
	West Bengal	43	7575	9	500	9	730
	Orissa	28	5634	13	650	1	40
	Jharkhand	16	3617	2	150	1	60
	Total ——>	**116**	**20489**	**30**	**1620**	**15**	**945**
North	Bihar	13	2460	5	290	2	180
	Uttar Pradesh	92	11340	12	550	3	270
	Uttranchal	19	2400	10	310	2	80
	Total ——>	**124**	**16200**	**27**	**1150**	**7**	**530**
North-West	Chandigarh	4	640	2	100	1	150
	Haryana	23	5210	10	535	3	150
	Jammu & Kashmir	12	2910	2	70	1	20
	Delhi	22	4826	7	535	3	210
	Punjab	35	6776	18	930	0	0
	Rajasthan	25	2580	12	700	1	40
	Himachal Pradesh	6	805	2	80	0	0
	Total ——>	**127**	**23747**	**53**	**2950**	**9**	**570**
South	Andhra Pradesh	98	18755	19	910	4	200
	Pondicherry	5	890	1	20	1	20
	Tamil Nadu	212	51514	21	1490	14	870
	Total ——>	**315**	**71159**	**41**	**2420**	**19**	**1090**
South-West	Karnataka	199	36034	80	4390	0	0
	Kerala	42	8960	22	1165	1	60
	Total ——>	**241**	**44994**	**102**	**5555**	**1**	**60**
West	Maharashtra	171	42758	69	4050	15	1025
	Goa	7	1100	1	10	2	120
	Daman & D,Dadar,N	2	270	0	0	0	0
	Total ——>	**180**	**44128**	**70**	**4060**	**17**	**1145**
	Grand Total	**1197**	**242698**	**343**	**18775**	**68**	**4340**

Source: AICTE Handbook for Approval Process

Table 4.7 : STATEWISE LISTING OF MBA-MCA INSTITUTIONS AND SANCTIONED INTAKE AS ON MARCH 31, 2003

Region	States/Union Territory	MBA		MCA	
		NOI	Intake	NOI	Intake
Central	Madhya Pradesh	31	2675	50	2830
	Chhatisgarh	6	520	6	310
	Gujarat	30	2195	24	1356
	Total ——>	**67**	**5390**	**80**	**4496**
East	Mizoram	0	0	0	0
	Sikkim	0	0	1	45
	West Bengal	20	2625	20	900
	Tripura	0	0	0	0
	Meghalaya			0	0
	Arunachal Pradesh	0	0	0	0
	Andaman & Nicobar	0	0	0	0
	Assam	6	337	3	120
	Manipur	1	30	0	0
	Nagaland	0	0	0	0
	Orissa	23	1512	42	2427
	Jharkhand	6	645	2	120
	Total ——>	**56**	**5149**	**68**	**3612**
North	Bihar	11	985	3	120
	Uttar Pradesh	97	7305	91	5685
	Uttranchal	12	705	12	670
	Total ——>	**120**	**8995**	**106**	**6475**
North-West	Chandigarh	1	30	0	0
	Haryana	22	1515	31	1710
	Jammu & Kashmir	5	240	2	70
	Delhi	36	5920	17	865
	Punjab	22	1335	35	2050
	Rajasthan	29	1795	14	820
	Himachal Pradesh	1	60	0	0
	Total ——>	**116**	**10895**	**99**	**5515**
South	Andhra Pradesh	159	8340	268	13045
	Pondicherry	2	120	6	240
	Tamil Nadu	144	8565	207	11135
	Total ——>	**305**	**17025**	**481**	**24420**
South-West	Karnataka	78	4621	84	4385
	Kerala	17	940	30	1425
	Total ——>	**95**	**5561**	**114**	**5810**
West	Maharashtra	168	11268	57	2898
	Goa	3	120	1	30
	Daman & Diu,Dadar,N.H.	0	0	0	0
	Total ——>	**171**	**11388**	**58**	**2928**
	Grand Total	**930**	**64403**	**1006**	**53256**

Source: AICTE Handbook for Approval Process

Table 4.8 : STATE AND REGION-WISE DISTRIBUTION OF NUMBER OF INSTITUTIONS AND SANCTIONED INTAKE PER MILLION POPULATION IN ENGINEERING

Region	State/Union Territory	No. of Institutes	Intake	Population (in million)	Intake per million population
Central	Madhya Pradesh	45	12970	60.385	214.8
	Chattisgarh	12	3385	20.796	162.8
	Gujarat	25	9559	50.597	188.9
	Total ——>	**82**	**25914**	**131.778**	**196.6**
East	Mizoram	1	120	0.891	134.7
	Sikkim	1	420	0.54	777.8
	West Bengal	45	10709	80.221	133.5
	Tripura	1	160	3.191	50.1
	Meghalaya	1	135	2.306	58.5
	Arunachal Pradesh	1	210	1.091	192.5
	Andaman & Nicobar	0	0	0356	0
	Assam	3	720	26.638	27.0
	Manipur	1	150	2.389	62.8
	Nagaland	0	0	1.989	0.0
	Orissa	38	9505	36.707	258.9
	Jharkhand	7	1890	26.909	70.2
	Total ——>	**99**	**24019**	**183.228**	**131.3**
North	Bihar	7	1575	82.879	19.0
	Uttar Pradesh	83	22491	166.053	135.4
	Uttranchal	9	2290	8.48	270.0
	Total ——>	**99**	**26356**	**257.412**	**102.4**
North-West	Chandigarh	3	580	0.901	643.7
	Haryana	33	9385	21.083	445.1
	Jammu & Kashmir	5	1245	10.07	123.6
	Delhi	13	3540	13.783	256.8
	Punjab	33	8875	24.289	365.4
	Rajasthan	29	7807	56.473	138.2
	Himachal Pradesh	3	610	6.077	100.4
	Total ——>	**119**	**32042**	**132.676**	**241.5**
South	Andhra Pradesh	215	64300	75.728	849.1
	Pondicherry	6	1950	0.974	2002.1
	Tamilnadu	250	79122	62.111	1273.9
	Total ——>	**471**	**145372**	**138.813**	**1047.3**
South-West	Karnataka	111	40385	52.734	765.8
	Kerala	73	17858	31.839	560.9
	Total ——>	**184**	**58243**	**84.573**	**688.7**
West	Maharashtra	151	47035	96.752	486.1
	Goa	3	740	1.344	550.6
	Daman & Diu	0	0	0.158	0
	Total ——>	**154**	**47775**	**98.254**	**486.2**
	Grand Total	**1208**	**359721**	**1026.734**	**350.4**

National Average: (Intake per million population) : 350.4

Source : Census of India 2001

Fig. 4.6 (a) : REGIONAL DISTRIBUTION OF DIPLOMA (ENGG.) INSTITUTIONS AS ON MARCH 31, 2003

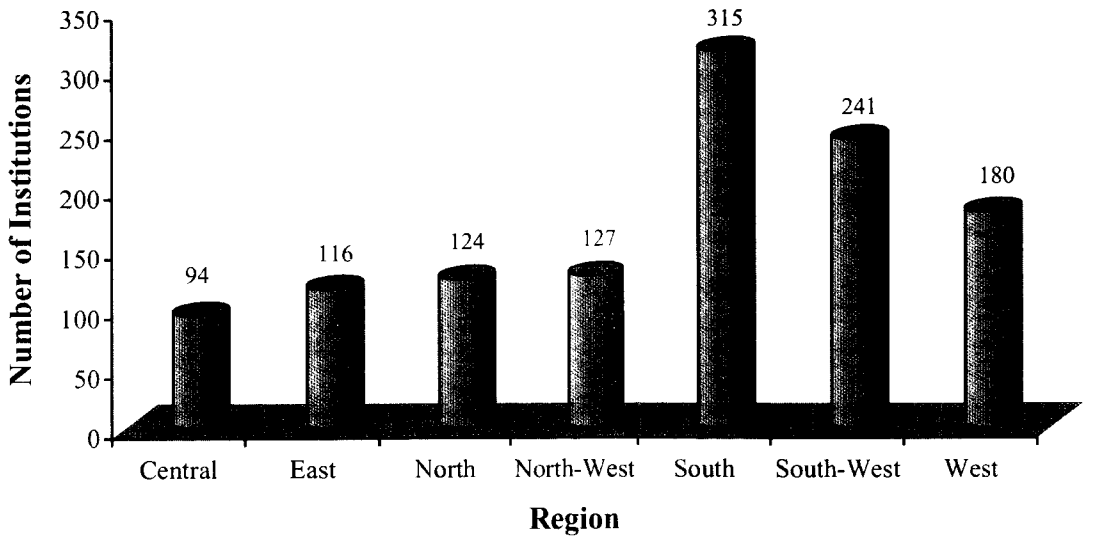
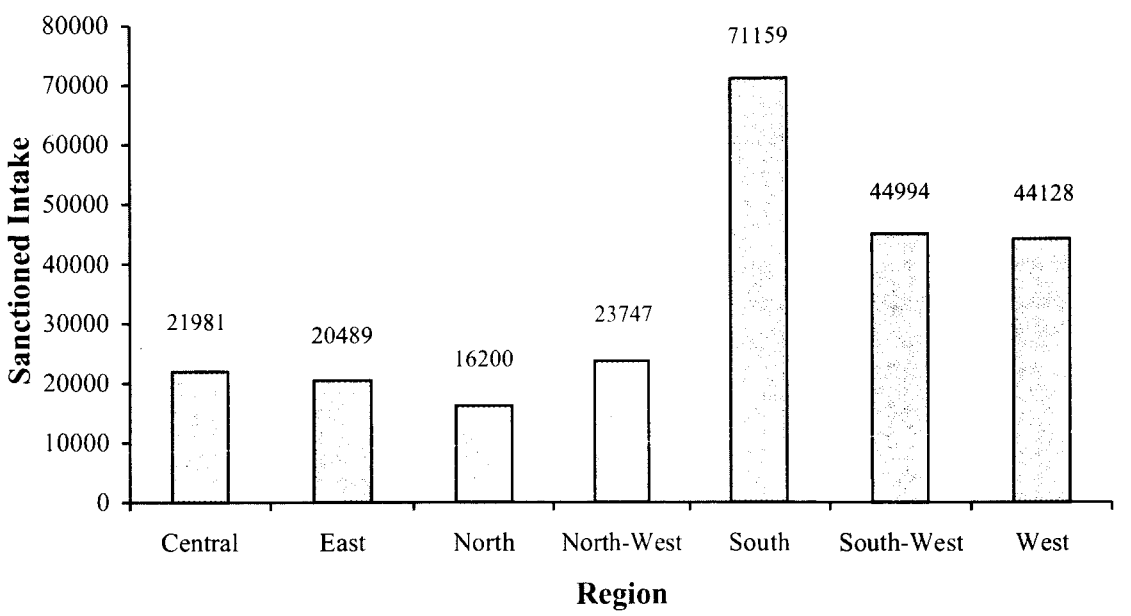


Fig. 4.6 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN DIPLOMA (ENGG.) INSTITUTIONS AS ON MARCH 31, 2003



ource : AICTE Handbook for Approval Process

Fig. 4.7 (a) : REGIONAL DISTRIBUTION OF DEGREE (ENGG.) INSTITUTIONS AS ON MARCH 31, 2003

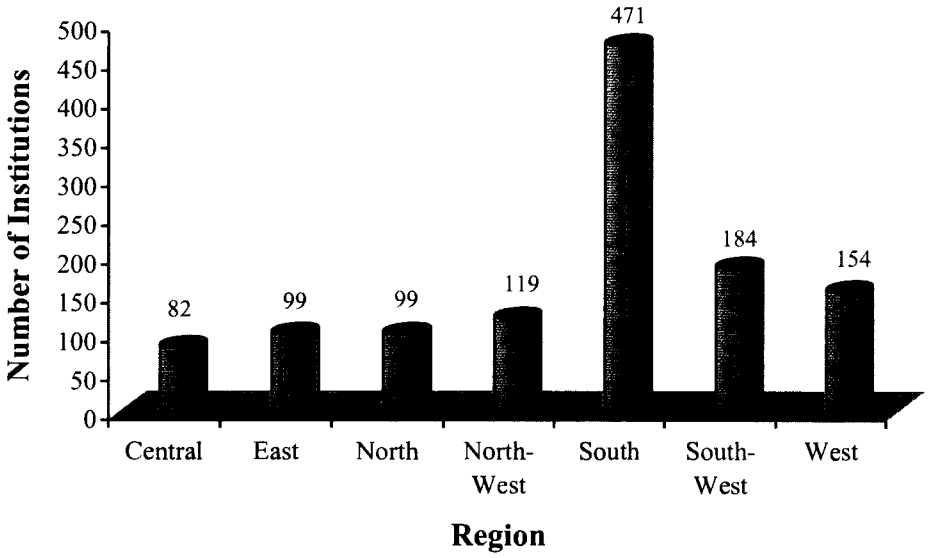
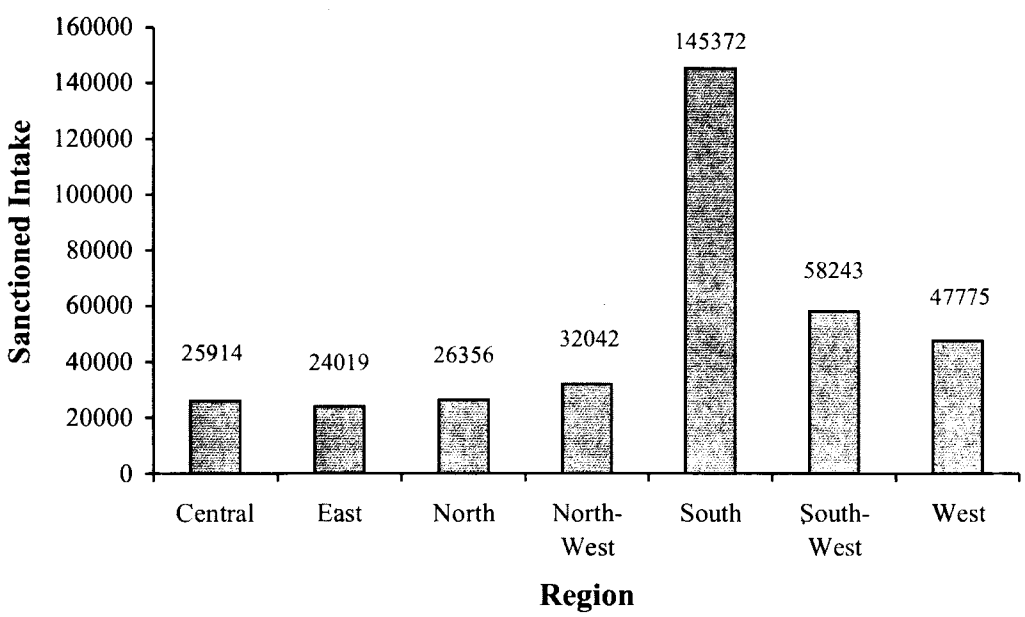


Fig. 4.7 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN DEGREE (ENGG.) INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

Fig. 4.8 (a) : REGIONAL DISTRIBUTION OF MBA INSTITUTIONS AS ON MARCH 31, 2003

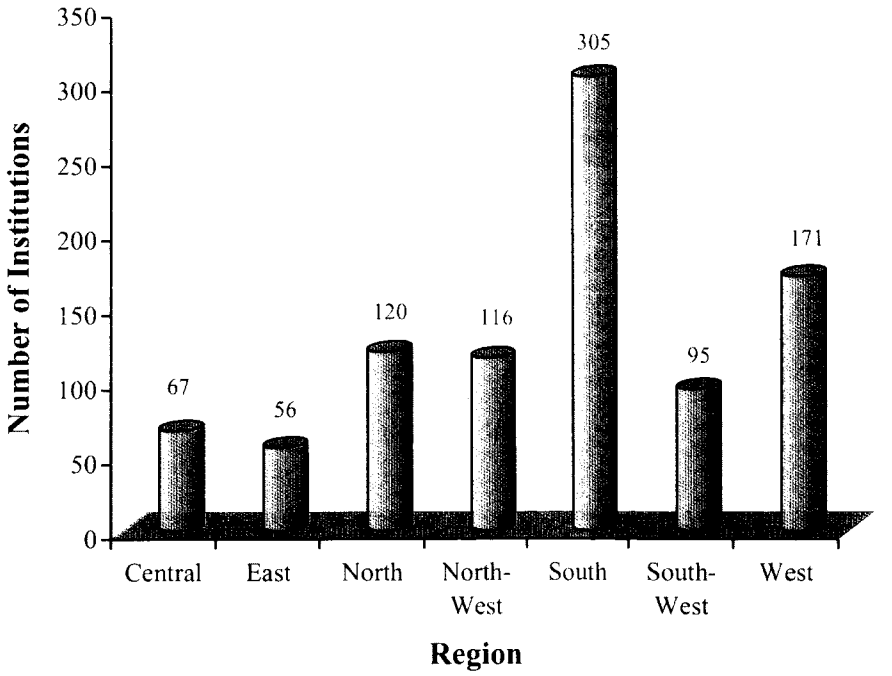
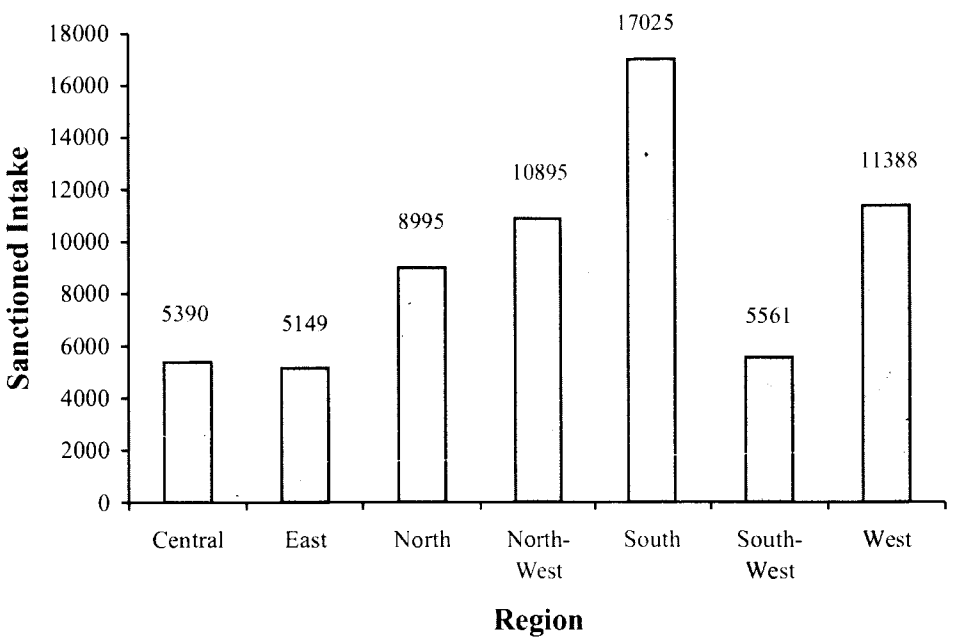


Fig. 4.8 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN MBA INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

Fig. 4.9 (a) : REGIONAL DISTRIBUTION OF THE MCA INSTITUTIONS AS ON MARCH 31, 2003

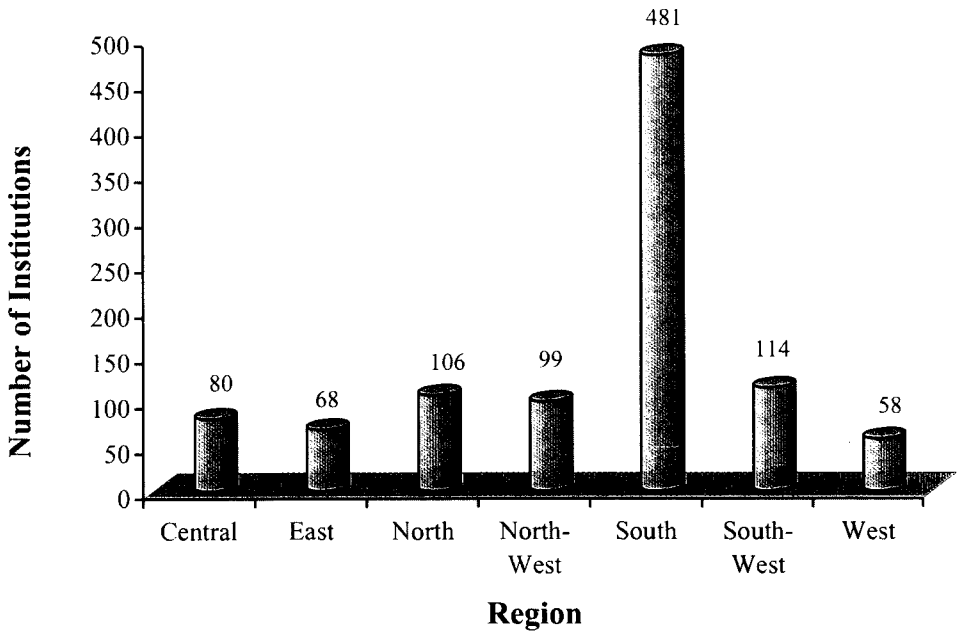
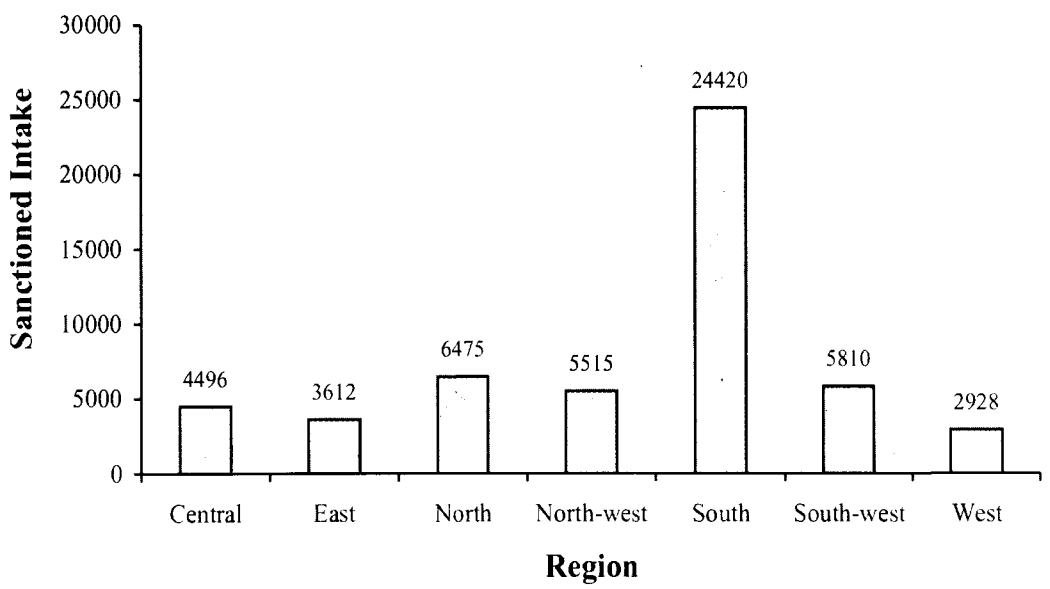


Fig. 4.9 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN MCA INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

Fig. 4.10 (a) : REGIONAL DISTRIBUTION OF B. PHARMACY INSTITUTIONS AS ON MARCH 31, 2003

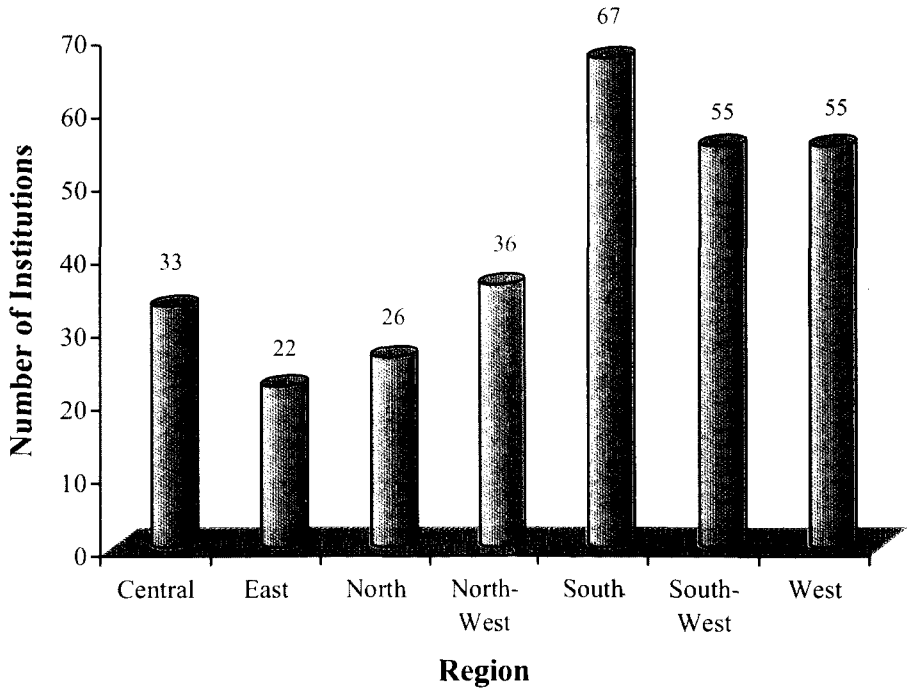
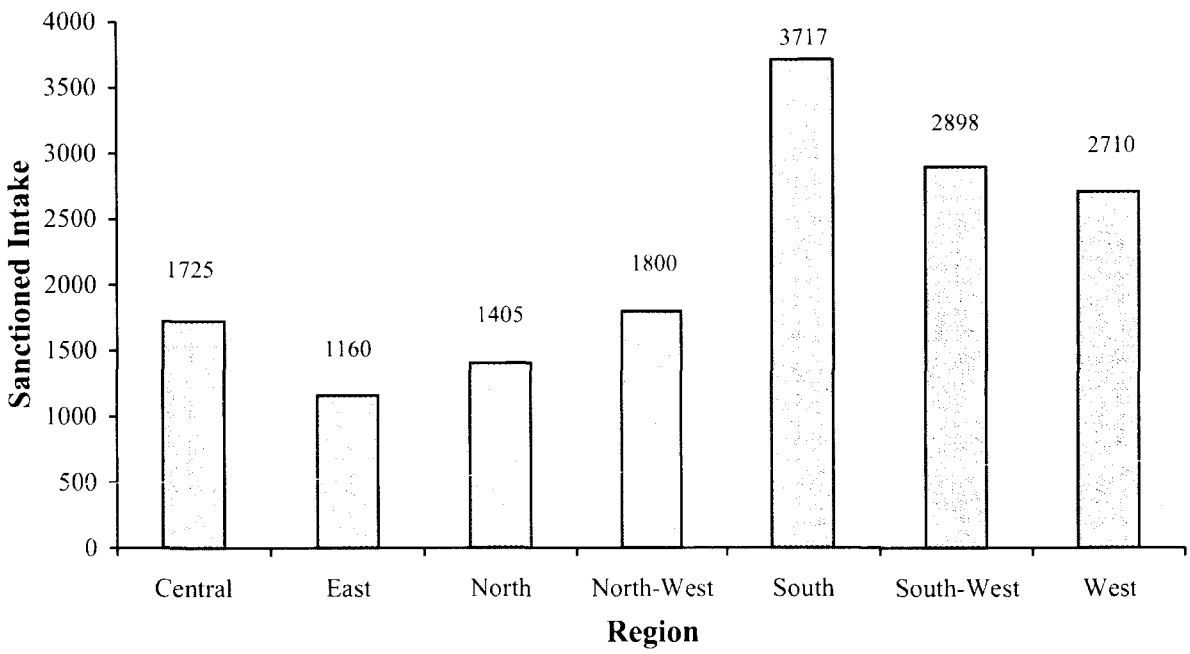


Fig. 4.10 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN B. PHARMACY INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

Fig. 4.11 (a) : REGIONAL DISTRIBUTION OF B. HMCT INSTITUTIONS AS ON MARCH 31, 2003

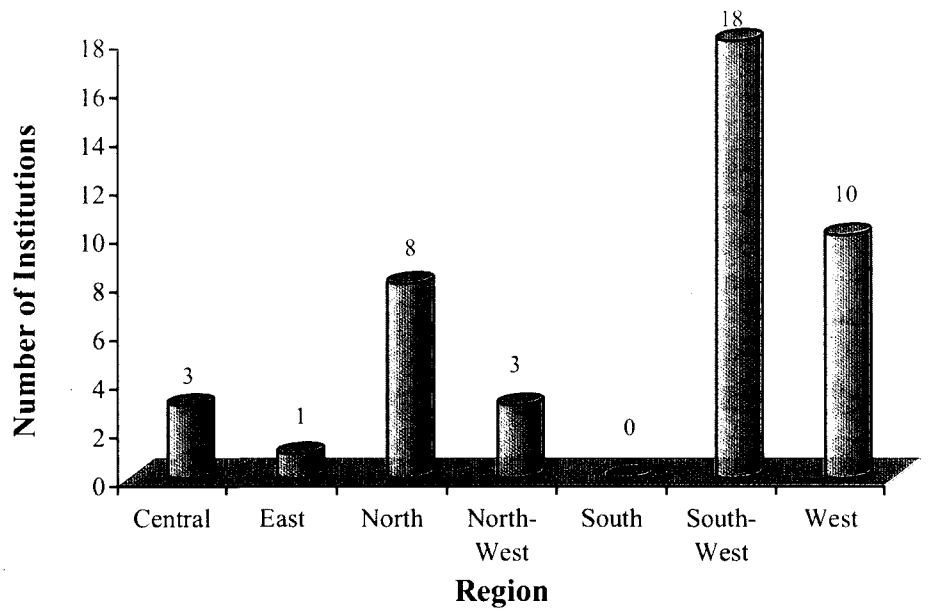
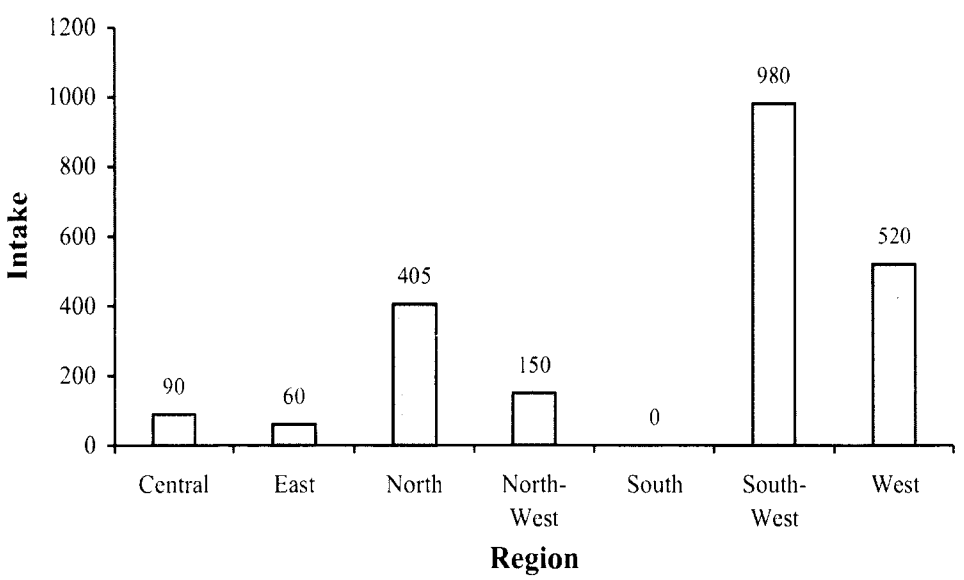


Fig. 4.11 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN B. HMCT INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

Fig. 4.12 (a) : REGIONAL DISTRIBUTION OF B. ARCHITECTURE INSTITUTIONS AS ON MARCH 31, 2003

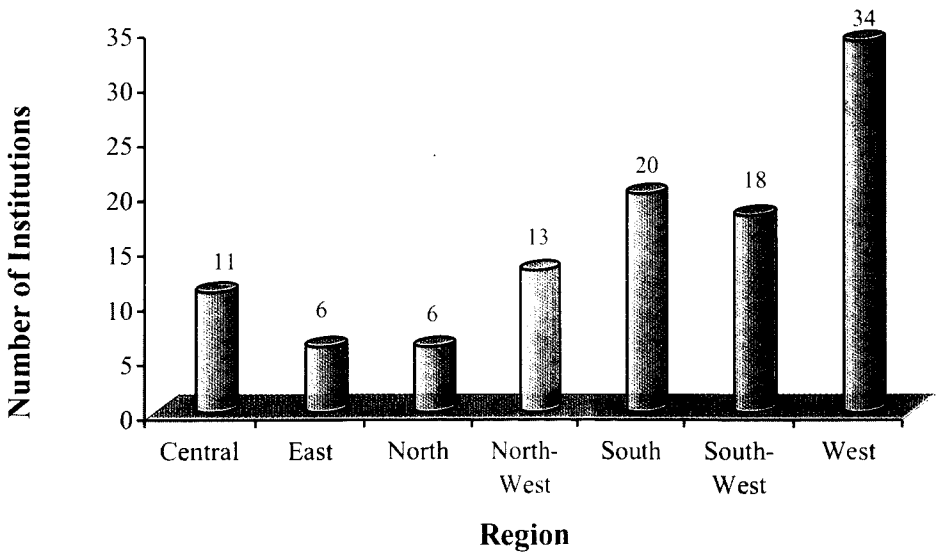
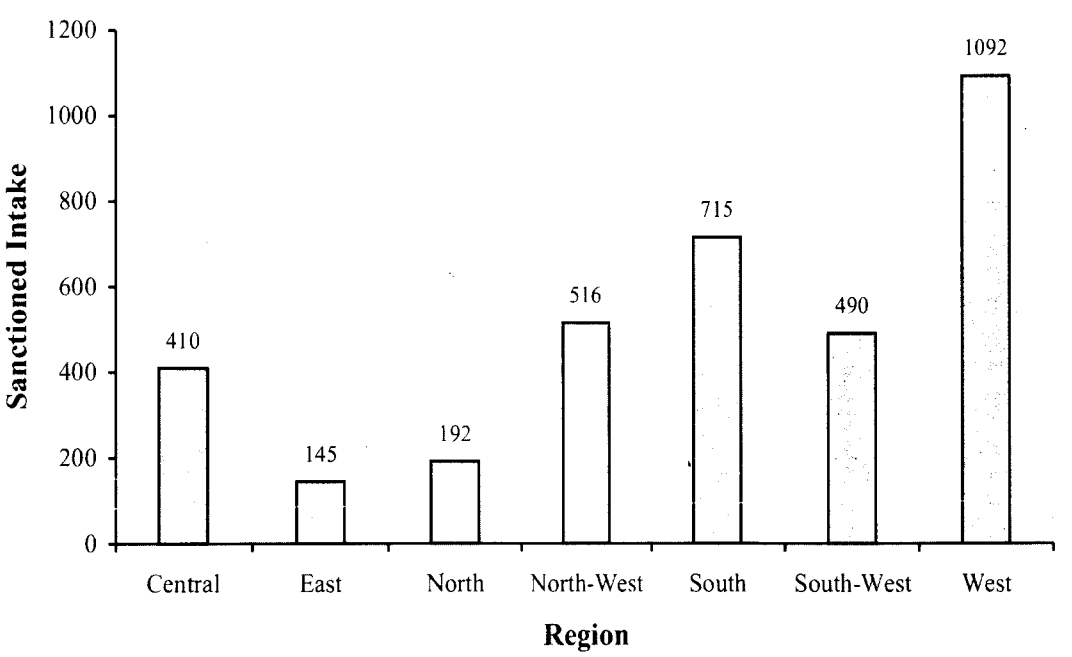


Fig. 4.12 (b) : REGIONAL DISTRIBUTION OF SANCTIONED INTAKE IN B. ARCHITECTURE INSTITUTIONS AS ON MARCH 31, 2003



Source : AICTE Handbook for Approval Process

The AICTE and the Government are responsible for coordinated development of technical education. International experience suggests that fees alone cannot meet the entire cost of technical education. Government must play a part in facilitating the setting up of the institutions. In order to promote the establishment of quality technical education in deficit areas, this committee suggests measures such as (i) Setting up of two National institutions of technology in the unserved areas in each plan period; (ii) Joint venture with private industries in such regions for funding new institutions; (iii) Central Government setting up institutions, running them for a few years and handing them over to State Governments or private enterprises - Build-Operate-Transfer (BOT) method; (iv) Use Bharat Shiksha Kosh for funding the establishment of institutions in unserved areas; and (5) Extensive use of distance education facilities.

This committee believes that proactive support of private enterprises through tax incentives by the Central Government, provision of free land and basic infrastructure from the State Government and promise of reasonable support from the AICTE for acquiring facilities and equipment through MODROBS, would encourage many private enterprises to start new institutions in uncovered areas. The committee further recommends that a small committee of experts may examine all these suggestions in detail for implementation.

Geographic inequities cannot be strictly controlled particularly with regard to private institutions/ enterprises, the growth of which depends on the availability and willingness of private initiatives in each region. The committee is also aware that over 25-30% of students studying in the technical institutions in the South are from the northern States having meager facilities. The AICTE must be more rigid and demanding in the case of new institutions starting in States where the number is already high. The committee recommends that the AICTE has a dialogue with State Government authorities of Northern and North Eastern States and encourage them to proactively support such private initiatives in the interest of their own economic growth, in addition to implementing some of the suggestions made earlier for improving technical education facilities in scarcity areas.

4.1.6 Selection of Students for Admission to Technical Institutions

[Clause 10(o)]

The AICTE has laid down guidelines for admission of students to technical institutions and Universities imparting technical education. However, more than 5 lakh school students seeking admission into these institutions

face the difficulty of preparing and taking a multiplicity of entrance tests, resulting in great hardship and expense. The committee strongly urges the AICTE to evolve a more rational and streamlined two-tier process for the selection of students. The first tier could be a national entrance test involving Optical Marking Reader (OMR) based on common minimum nationally accepted syllabus, to be held simultaneously at different centers in the country, the results of which along with appropriately weighted marks obtained at Class 10 level as well as 10+2 could be used for short-listing eligible candidates. The second test could be a more rigorous one, restricted to those who have been short-listed in the first test. Using the presently available technical facility for downloading question papers at any center, just a few minutes prior to the test, it is possible to ensure non-leakage of question papers. NRIs and foreign students who wish to join Indian Institutions must also be subjected to the same test, which can be held at selected centers outside India. A single national list of eligible candidates can then be evolved for use by various institutions anywhere in the country. The committee also recommends that such selection be done twice a year to ensure that students who miss out in the first opportunity have a second chance to prove their credentials. The AICTE should set up a separate autonomous national testing organization for this purpose.

4.1.7 Promotion of Technical Education for Women, Handicapped and Weaker Sections

Section 10 (e) of the AICTE Act stipulates that it shall be the duty of the AICTE to "formulate schemes for promoting technical education for women, handicapped and weaker sections of the society". Table 4.9 gives the percentage-wise intake of women, SC and ST candidates in engineering degree institutes in selected States as existed during 1999-2000. The AICTE must gather complete statistics in all States and update these frequently to monitor the progress in this regard. Even though the enrolment of women in engineering has significantly improved over the years, it is still unsatisfactory. In so far as the mandate of the Council for formulating schemes for women, and the physically disabled is concerned, the AICTE has not evolved any separate scheme except for providing some relaxation in age limit under the scheme of Career Award for Young Teachers and in project and Travel Grant Schemes. Insofar as schemes for promoting technical education for weaker sections of the Society are concerned no specific schemes have been formulated by the Council. However, the State Governments have their own schemes for reservations as also for other benefits for students and faculty belonging to the weaker sections of society.

Table 4.9 : PERCENTAGE-WISE INTAKE OF WOMEN, SC AND ST CANDIDATES IN TECHNICAL EDUCATION BY SELECTED STATES

DEGREE LEVEL

State	Women Candidates	SC Candidates	ST Candidates
Arunachal Pradesh	4.81	13.70	14.44
Assam	10.88	10.29	9.82
Tripura	11.04	20.24	6.13
West Bengal	9.59	13.59	3.16
Karnataka*	19.55	4.61	0.85
Goa, Daman & Diu	17.32	3.39	0.36
Gujarat	19.37	6.80	4.47
Maharashtra	7.51	11.99	6.34
Chandigarh*	17.20	16.67	3.49
Delhi	11.97	15.21 (Combined SC/ST)	
Haryana	16.20	9.07 (Combined SC/ST)	
Himachal*	7.50	13.75	4.38
Punjab*	15.32	12.87	1.47
Rajasthan	17.23	8.78	4.27
Kerala	32.30	NA	NA
Tamil Nadu	25.07	NA	NA
Andhra Pradesh	24.91	11.33	4.53
Madhya Pradesh	11.12	4.76	3.26

*Distribution of Outturn

Despite some improvement in the participation of women in technical education, women face the problem of accommodation much more than men. They need secure accommodation within the institutions and cannot avail of private sector accommodation as easily as men. Therefore, the AICTE should consider a development scheme for building accommodation for women students in all institutions and particularly in the private sector institutions.

The AICTE should conduct a study of the problems faced by Women, handicapped and weaker sections of the society, regarding their access to technical education as also during the period of their education and subsequent employment, based on which the AICTE should formulate specific schemes for the above.

4.1.8 Fixation of Fees

Nowhere in the world including in the US are students charged the full cost of education. Students are not the sole beneficiaries of higher education; employers and the society are equally so. Hence, all the three should share the cost. Normally, students fee meets only 15-20% of the costs of their education; in no case, should it be more than a third, if education is to be accessible to the deserving poor. The remaining cost should be met from Government scholarships or grants, and from endorsement from businesses. Steps should be taken to ensure that businesses pay for the benefits they get from employing technically trained graduates.

The Committee fully recognizes the need to charge enhanced fees in order to support the high cost of expenditure on education. However, many of the institutions, unaided ones in particular, have become money making machines, charging exorbitant fees but providing minimal facilities. Rapid commercialization of institutions has led to the severe degradation of the quality of students graduating from such institutions. Under clause 10(n) of the Act, the AICTE has the responsibility to take all steps to prevent commercialization of technical education. While uniformity of fees even in private institutions is not possible, the AICTE can fix limits on the fees to be charged for different categories of students.

Commercialization has other dimensions besides high fees. Unless these dimensions are investigated and the scope of the term commercialization defined precisely, it would be difficult to conceive of steps that the AICTE should take to prevent commercialization. Some of the attempts at commercial exploitation that need to be thwarted are:

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Commercialization has other dimensions besides high fees. Unless these dimensions are investigated and the scope of the term commercialization defined precisely, it would be difficult to conceive of steps that the AICTE should take to prevent commercialization. Some of the attempts at commercial exploitation that need to be thwarted are:

- Charging of a lump sum amount below the counter for filling up management quota/paid seats/NRI ar NRI-sponsored quota.
- Collecting additional fees as administrative expenses, including for transport, hostel, etc.
- Showing payment of salaries at prescribed levels while making actual payments at much lower level
- Saving under the head of salaries by not employing adequate number of teachers, employing fres graduates on low adhoc payments, not paying them for vacation, denying long-term benefits, etc., ar utilizing the amount saved for other expenses that yield personal benefits to promoters.

Institutions not paying enough attention to improvements in quality and instead, showing tendencies fo commercialization should be put under close watch. Within the powers of the AICTE, such institutions shou be penalized and permitted to wither away. Awareness development about quality and building up an environme of competition should be aimed at, which will result in driving badly run institutions out of the market.

The AICTE must immediately constitute a small committee of experts to examine the financial viabili of the institutions both Government aided and the private ones to fix appropriate guidelines on the quantum fees to be charged from the students under different categories.

4.1.9 Deemed Universities / Autonomous Institutions

The AICTE has laid down a detailed procedure for advising UGC for declaring any institution imparti technical education as Deemed to be University. There are over 45 Deemed Universities in existence as 2003. However, the AICTE has no hold on these institutions after they obtain autonomous or deemed stat which negates the role of the AICTE of maintaining norms and standards. There is neither any independ check on the institutions which have attained deemed or autonomous status, nor has the Review Commit seen any evidence of such institutions having a transparent and rigorous independent audit on the quality education they are imparting and research they are carrying out. Such institutions have an extremely unsatisfact state of affairs, which needs to be rectified in the interest of ensuring high quality education. Application rigorous criteria for recognition of deemed status and mandatory requirement of periodic validation, at le once in five years, of the quality of education imparted by such institutions are needed as elaborated in Sect 2 of Chapter-7.

4.1.10 Regulation of Foreign Universities / Institutions Imparting Technical Education

There has been a plethora of foreign universities/institutions entering the field of technical education in India, either directly or through collaboration arrangements with Indian Universities, institutions or private parties. Many of the foreign enterprises also offer degrees of their own to lure the gullible public, who often think that a foreign degree has greater market value than the Indian degree. While collaboration and partnership between Indian and foreign Universities / institutions in the field of technical education, research and training is to be welcomed, development of quality education demands that such foreign institutions / Universities must be made accountable for upholding the norms and standards. Some of these foreign institutions have also been resorting to franchising methodology, proliferating poor quality education.

The Committee is very happy to note that the AICTE has recently come out with a gazette notification [No.F.37-3/Legal(vi) 2003] spelling out detailed regulations for entry and operation of the foreign Universities / institutions wanting to establish operation in India for imparting technical education. In essence, these regulations call for

- Mandatory registration with the AICTE, of the institution seeking to operate in India either directly or through collaborative agreement with an Indian university/institution or a private educational provider along with (i) No Objection Certificate from the concerned Embassy in India which must certify the genuineness of the institution; and (ii) Detailed Project Report (DPR) along with the application giving all information regarding infrastructure facilities, faculty position, prescribed fees, courses, curricula and availability of funds for a minimum three years of operation;

- Valid accreditation of the institution intending to set up educational facility in India by the authorized agency in its own parent country;

- Where collaboration with an Indian institution is proposed, the AICTE must ensure that the said Indian institution is an affiliated one and preferably accredited by NBA;

- Giving an undertaking that the degrees/diplomas awarded to the students in India shall be treated on par with the corresponding degree in the parent country;

- Assuring that the degrees awarded by them have same nomenclature as in their parent country;

- Declaration of detailed guidelines for admission of students including entry level qualifications, which must be consistent with the AICTE prescription and examination pattern;
- Obtaining the AICTE approval prior to the starting of course in India; and
- Getting the AICTE accreditation soon after two batches of students have passed out from such centers.

The Committee fully endorses the step taken by the AICTE which will go a long way in ensuring that only high quality technical Universities / institutions, genuinely serious about promoting quality education, will enter the technical education field in India.

4.2 Faculty Development

4.2.1 The AICTE has constituted a separate Faculty Development Committee under Prof. U.R. Rao, with expert members drawn from a number of institutions and disciplines to look into the requirement of faculty and suggest directions to improve the quality as well as the quantity of the teachers for meeting the growing needs of all the institutions which come under the purview of the AICTE. Based on the data collected from different institutions and sources, Prof. J.P. Srivastava has recently estimated that over 10,000 Ph.Ds will be required in the next 3-4 years to meet the basic needs of the engineering institutions in the country. The faculty position as analyzed by Anil Kumar of NTMIS shows the position is much worse than that of Prof. Srivastava's estimate. As per his detailed analysis of faculty position in 2000-01, based on the requirement of 1:15 teacher to student ratio and a ratio of 1:2:4 for Professors, Readers and Lecturers for an intake of 2,28,511 engineering undergraduates as existed then (9,14,044 UGs for 4 years), the total requirement of teachers was 60,970, composed of 8,710 professors, 17,420 readers and 34,840 lecturers. The required number of Ph.Ds and M.Techs, as per the above estimate was 26,130 and 34,840 respectively as against the then availability of 5,862 Ph.Ds and 11,035 M.Techs. The largest shortfall of teachers of over 11,172 Ph.Ds and 11,441 M.Techs was in the southern region, with Tamil Nadu alone accounting for almost 50% of this shortfall.

Due to the sharp increase in the sanctioned intake of engineering students to 3,59,721 (14,38,884 in 4 years), the requirement of faculty has further escalated to 95,924, composed of 13,703 professors, 27,40

eaders and 54,814 lecturers, which would ideally demand 41,111 Ph.Ds and 54,814 M.Tech.s for meeting ıe present requirement of quality teachers. Table 4.10 shows the state and region-wise requirement of faculty. able 4.11 gives the qualification-wise faculty requirement in engineering institutions alone for different blocks f four year periods. Figures 4.13 and 4.14 depict the growth in the requirement of teachers and region-wise equirement of teachers in degree engineering for the period 2002-2005. Figure 4.15 shows the demand and upply of Ph.Ds in the country required to meet the basic requirements of the engineering institutions. As of oday, if we go strictly according to the prescribed norms, there is shortfall of over 26,000 Ph.Ds and 30,000 M.Tech.s for meeting the teaching requirements in the engineering institutions alone. Even if the teacher to tudent ratio is relaxed to 1:20, the shortfall in Ph.Ds and M.Tech.s would still be over 18,000 and 20,000 M.Techs.

The faculty position in other disciplines such as MCA, management education, pharmacy, architecture nd town planning and applied arts is as bad, if not worse. For example, a sanctioned intake of 64,403 tudents (1,28,806 for 2 years) in 930 business management institutions, have less than 4,000 teachers, as gainst the requirement of 8,557 teachers, which works out to a teacher to student ratio of 1:32. If IIM's, hich are fairly well staffed, are taken out from the list, the rest of business management schools have less than our teachers per institution on an average. While industry stalwarts and retired professors have been inducted y these institutions for supplementing their own in-house resources, the prevailing situation is totally nsatisfactory. The situation regarding disciplines like Pharmacy, Architecture, Town Planning, Hotel Management and applied arts suffer as badly as the business management schools (Table-4.12). Most often etired Professors, who are engaged in this task, work in two or more institutions compromising on the quality f attention they can give to this important task. Many of the private colleges, in particular, employ fresh raduates, passing out of the college with poor grades, as teachers thus totally compromising on the quality of achers. It must be recognized that mediocrity in the teaching fraternity can only multiply mediocrity and annot lead to the creation of excellence. It is obvious that unless the problem related to the availability of ualified teachers is solved on a war footing, which requires both short term as well as long-term programmes, e will continue to manufacture poorly equipped personnel and not motivated and knowledgeable technical aduates who can contribute value addition to the national economy.

Since reliable data on the faculty position in other areas is not available, the AICTE must take mediate steps to determine the demand-supply of Ph.D and Masters Degree holders for meeting the ching requirements for all the disciplines including MBA, MCA, Pharmacy, Architecture, Hotel Management

Table 4.10 : STATE AND REGION-WISE REQUIREMENT OF FACULTY IN DEGREE ENGINEERING INSTITUTIONS

Region	State/Union Territory	No. of Institutes	Intake for 2002-03	Requirement of Faculty during 2002-03
Central	Madhya Pradesh	45	12970	3459
	Chattisgarh	12	3385	903
	Gujarat	25	9559	2549
	Total	**82**	**25914**	**6910**
East	Mizoram	1	120	32
	Sikkim	1	420	112
	West Bengal	45	10709	2856
	Tripura	1	160	42
	Meghalaya	1	135	36
	Arunachal Pradesh	1	210	56
	Andaman & Nicobar	0	0	0
	Assam	3	720	192
	Manipur	1	150	40
	Nagaland	0	0	0
	Orissa	38	9505	2534
	Jharkhand	7	1890	504
	Total	**99**	**24019**	**6405**
North	Bihar	7	1575	420
	Uttar Pradesh	83	22491	5997
	Uttranchal	9	2290	611
	Total	**99**	**26356**	**7028**
North-West	Chandigarh	3	580	155
	Haryana	33	9385	2503
	Jammu & Kashmir	5	1245	332
	Delhi	13	3540	944
	Punjab	33	8875	2366
	Rajasthan	29	7807	2082
	Himachal Pradesh	3	610	162
	Total	**119**	**32042**	**8544**
South	Andhra Pradesh	215	64300	17147
	Pondicherry	6	1950	520
	Tamilnadu	250	79122	21099
	Total	**471**	**145372**	**38766**
South-West	Karnataka	111	40385	10769
	Kerala	73	17858	4762
	Total	**184**	**58243**	**15531**
West	Maharashtra	151	47035	12543
	Goa	3	740	197
	Daman & Diu	0	0	0
	Total	**154**	**47775**	**12740**
	Grand Total	**1208**	**359721**	**95924**

Source : AICTE Handbook for Approval Process

Table 4.11 : CATEGORY-WISE FACULTY REQUIREMENT IN ENGINEERING INSTITUTIONS

Year	Professors	Lecturers	Readers
1994-1997	3951	15805	7902
1995-1998	4332	17329	8664
1996-1999	4859	19438	9719
1997-2000	5662	22650	11325
1998-2001	6694	26774	13387
1999-2002	8239	32956	16478
2000-2003	9767	39067	19533
2001-2004	11331	45324	22662

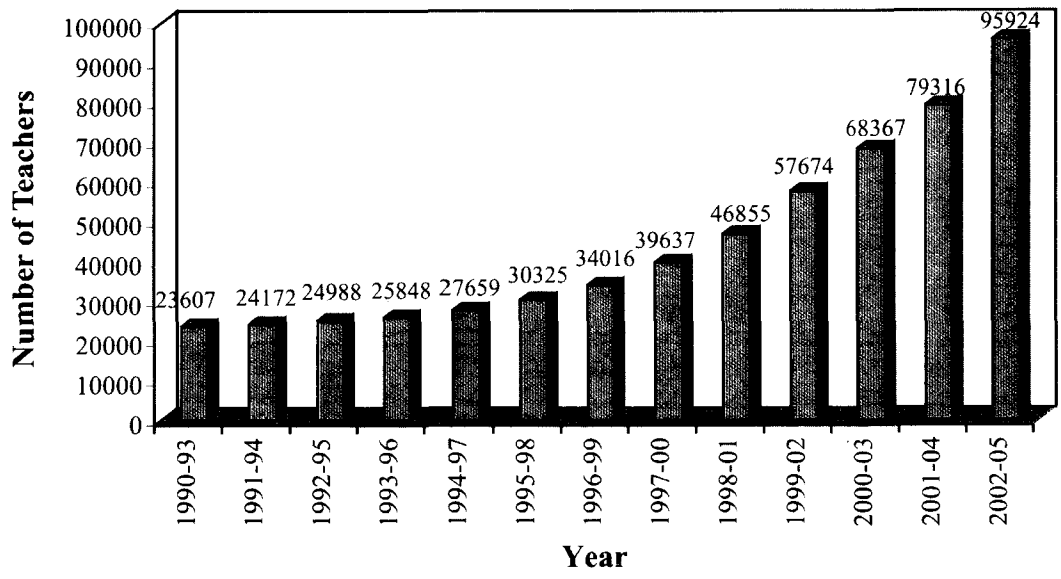
Source: Study report submitted by Prof. J. P. Srivastava under the AICTE R&D project

Table 4.12 : REQUIREMENT OF TEACHERS IN VARIOUS TECHNICAL DISCIPLINES

Discipline	Intake	Course Duration in Years	Years	Requirement of Teachers			
				Professors	Readers	Lecturers	Total
Engineering	359721	4	2002-05	13703	27407	54814	95924
MBA	64403	2	2002-03	1227	2543	4907	8557
MCA	53256	3	2002-04	1522	3043	6086	10651
Pharmacy	15415	4	2002-05	587	1175	2349	4111
HMCT	2205	4	2002-05	84	168	336	588
Architecture & Town Planning	3560	5	2002-06	170	339	678	1187

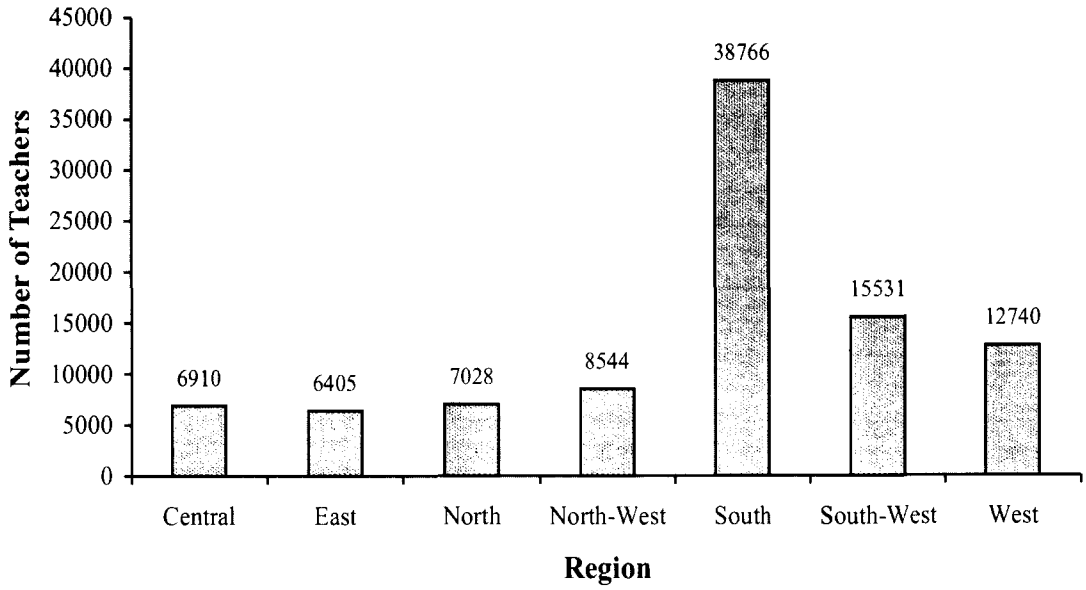
Source : AICTE Handbook for Approval Process

Fig. 4.13 : GROWTH IN THE REQUIREMENT OF TEACHERS (DEGREE ENGG.)



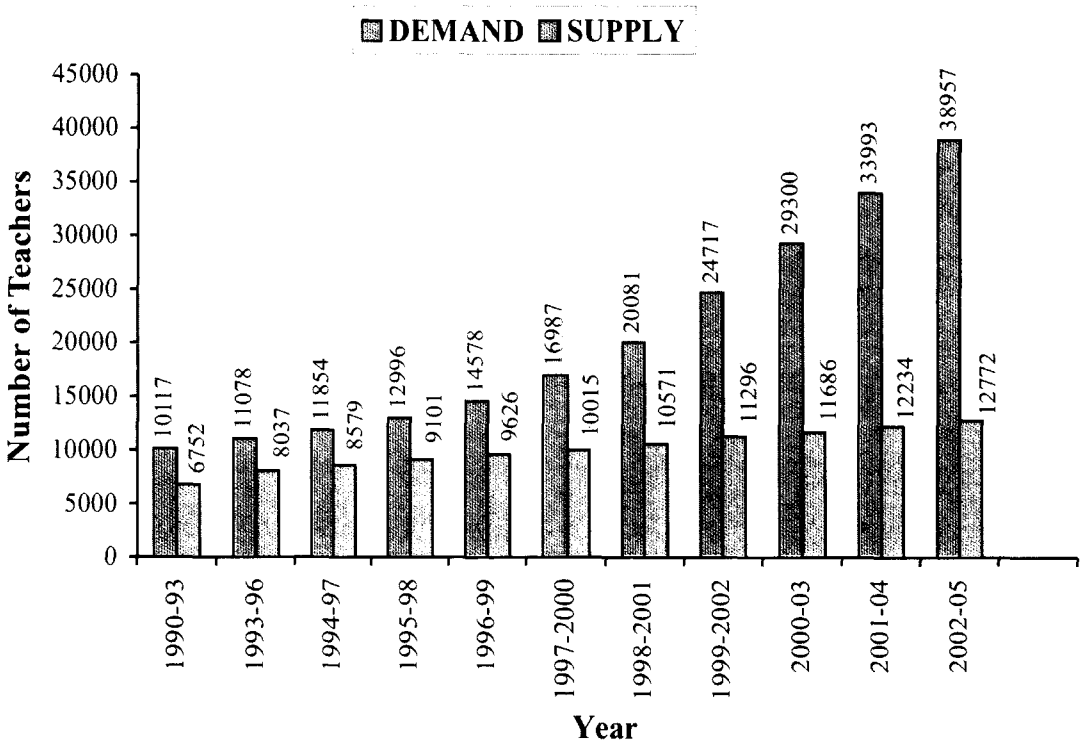
Source: (i) AICTE Annual Reports and (ii) AICTE Handbook for Approval Process

Fig. 4.14 : REGION-WISE REQUIREMENT OF TEACHERS IN DEGREE ENGINEERING INSTITUTIONS DURING 2002-2005



Source: AICTE Handbook for Approval Process

Fig. 4.15 : DEMAND AND SUPPLY OF Ph. Ds.



Source: Study report submitted by Prof. J. P. Srivastava under the AICTE R&D project

and Applied Arts. The above arithmetical analysis, assumes requirement of Ph.D's for all professors and readers, which is probably slightly on the higher side. Notwithstanding the fact that there is a very serious shortage of Ph.D's and M.Tech's for meeting the teaching requirements of technical education is irrefutable. The AICTE must take immediate steps to carry out a rigorous analysis to estimate the actual number of Ph.D's and M.Tech's needed in all disciplines under its purview and take every possible steps to rapidly overcome the shortfall, through both short-term and long-term measures to ensure the availability of quality education to all the students.

4.2.2 Short Term Schemes

- The AICTE should widely publicize the vacancy positions along with qualifications required, both within India and outside, taking into account the total number of such vacancies in all institutions. This information should be made available on the web. The candidates wishing to join as faculty members must be made aware of the fast track selections, appointments and promotions available to well qualified personnel. Appointments should be made quickly and such appointments should be initially on probation for a period of one year, at the end of which, they should be made permanent, based on their satisfactory performance.

    - Insisting that candidates applying from outside the country should be available for personal interview is totally unrealistic. Such candidates can be offered appointment straightaway based on their bio-data and reference letters. If necessary, a team of experts can be deputed to USA/Europe for a period of 15-20 days who can interview such candidates at identified locations and offer the jobs straightaway. Some of the IIT's, notably IIT Kanpur, was very successful in attracting highly qualified talent from outside in the initial years of its formation. Some of the departments like Department of Space have also been very successful in getting qualified people using this method, which works well if it is well planned and de-bureaucratized.

- The AICTE can institute a continuing teaching assistant program (junior or senior) in leading institutes like IIT's, NIT's and QIP centers. Bright B.Tech / M. Tech Students could be appointed as teaching assistants on attractive emoluments (Rs.10,000 - 15,000/- pm) and other benefits, after undertaking a bond from them to serve as teachers in any of the institutions selected by the AICTE for a minimum period of 5 years after their PG degree.

- Institutions must be encouraged to offer adjunct Professorships to technical experts working in research institutions and industries, on an attractive honorarium, for teaching a course of 12-15 lectures each year. This will also lead to the establishment of a better linkage with industries, which will benefit the students as well as the institution. Likewise, establishing linkages with research institutions will help in promoting their own faculty to register with institution experts for carrying out research leading to post-graduate / doctoral degree.

- Reputed faculty from leading institutions should be encouraged to spend a month or two at a time convenient to them, in institutions suffering from acute shortage of faculty.

- The AICTE should encourage employment of retired persons of repute. Reemployment upto 65 years should be allowed for those who are fit and have shown good performance. Recipients of "the AICTE fellowship for retired persons" should be encouraged to additionally teach a course in one or two neighbouring institutions where there is a shortage of faculty.

- All new persons recruited as fresh lecturers should undergo a well-orchestrated and planned technical teachers training program of a suitable duration. The AICTE should draw up a scheme for this and provide necessary financial support.

- The AICTE must immediately plan and implement an elaborate distance education scheme on war footing, to broadcast model syllabus based instructions in each of the disciplines which come under the purview of the AICTE to enable students along with their teachers to have access to the best possible content.

The distance education system must address the basic and fundamental problem of improving the quality of technical education, development of faculty and updating their knowledge at frequent intervals, updating of curricula in various disciplines, and ensuring that education is in tune with the professional standards, national needs and industry requirements. The scheme must be carefully designed to ensure that all the teachers and in turn their students are well equipped, know the latest technology and market trends and do not become obsolete. These issues have not been dealt with in a rigorous way. The contents for the nationwide broadcast have to be prepared by experts from reputed educational institutions, research establishments and industries. The AICTE must make it mandatory for technical institutions to set up receiving facilities with interactive channels for asking questions and obtaining clarifications. The Review Committee is convinced that the entire system will succeed only if the system is made totally self-financing (or at least mostly self-financing). Since the AICTE, Institution, experts involved and the students all have a large stake in such an exercise; it is indeed

possible to evolve a suitable totally self-financing scheme. A note, prepared by Prof. U.R. Rao, on the scheme, detailing the technology to be used, financing and management strategy, is given at Appendix 4.1. This has been endorsed by the Sub-Committee constituted under Prof. M.S. Ananth, of the Faculty Development Committee set up by the AICTE under the Chairmanship of Prof. U.R. Rao.

4.2.3 Long Term Strategies

- All Institutions including private institutions must be forced to necessarily depute 10% of their staff on half the salary, for undergoing quality improvement program to acquire Master and Doctoral education, by taking a bond to serve in the institution for a period of 3 years after the acquisition of their degree. The AICTE must expand the quality improvement program for this purpose and chip in to offer the other half of the salary as well as additional expense towards relocation of the deputationist. Even if the AICTE is able to identify 500 candidates each year from various institutions, the AICTE expense on this account will be about Rs.25 Crores calculated on the basis of an emolument of Rs.10,000/- per month (half salary) for each candidate.

- Premier institutions having research facilities such as IIT's, IIM's, IISc etc., should be asked to increase the intake for postgraduate and doctoral degrees and specifically earmark the increased numbers for the AICTE institutions. Flexibility for carrying out research during weekends and holidays could help in minimizing the residency period of teachers aspiring to obtain doctoral degrees from research establishments.

- The AICTE should make it mandatory for each industry/technical institution such as CSIR, DOS, DAE, DRDO and other National Laboratories to take 3rd and 4th year graduate students as short-term apprentices for training (which is anyway a part of their course). The number of such apprentices should be at least 5% of the total number of technical people working on the rolls of these industries / institutions.

- Early Faculty Induction Program (EFIP) for truly bright students, selected on the basis of merit and aptitude is an excellent method to enlist the services of 1000 students each year as teachers, after successful completion of their course. Attractive stipend to complete their course and support for obtaining postgraduate degrees should be given, provided they are willing to give a bond to serve as teachers in any of the institutions under the purview of the AICTE, for a period of 3 years after the completion of their studies. Such selected students, on completion of their degree, must be placed in the AICTE pool of technical teachers on the pattern of earlier CSIR pool.

- Consultancy should be encouraged and suitable rules should be framed and enforced in such a manner as to ensure that teaching is not adversely affected.

- At least 10% of the institutions in all disciplines, including management, hotel management, architecture and town planning, pharmacy and applied arts should be assisted to run masters and doctoral programs. The AICTE should provide special financial assistance through MODROBS, TAPTEC and other schemes, to be designed specifically for this purpose to these deserving institutions to be selected by a Committee based on their competency and track record.

- An integrated programme leading directly to a M.Tech. degree in 4 years after B.Sc. should be considered for introduction, in addition to the integrated M.Tech degree of 5 years for the bright students passing 10+2 examination.

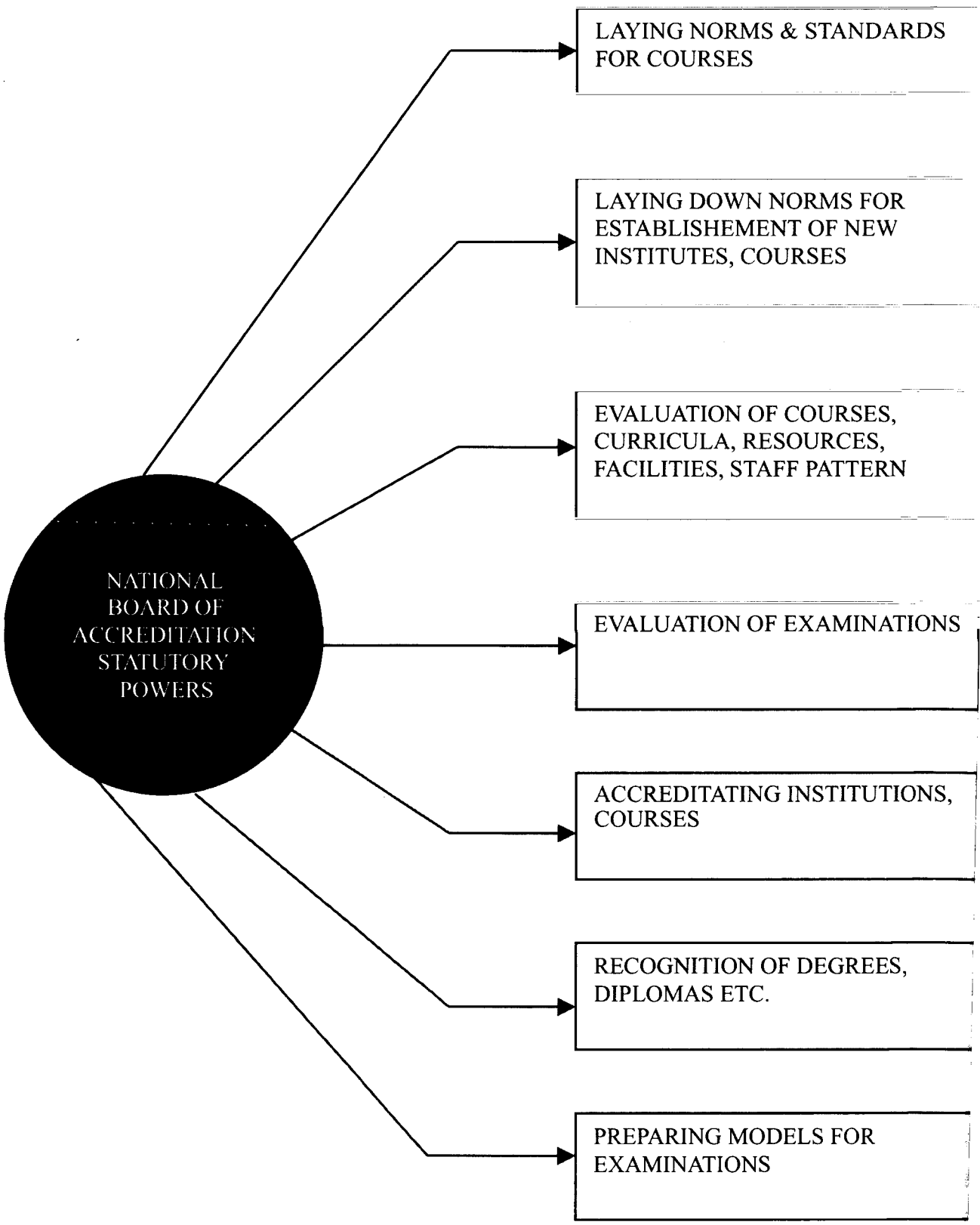
- The TTTIs' should be strengthened and equipped to handle induction and refresher courses for teachers at all levels.

- In order to provide a conducive environment to enable more qualified persons to join technical education institutions as teachers, the AICTE should create model service and career opportunity rules for teaching staff of private and Government aided institutes and facilitate their implementation.

4.3 **Accreditation** (Section 10 u)

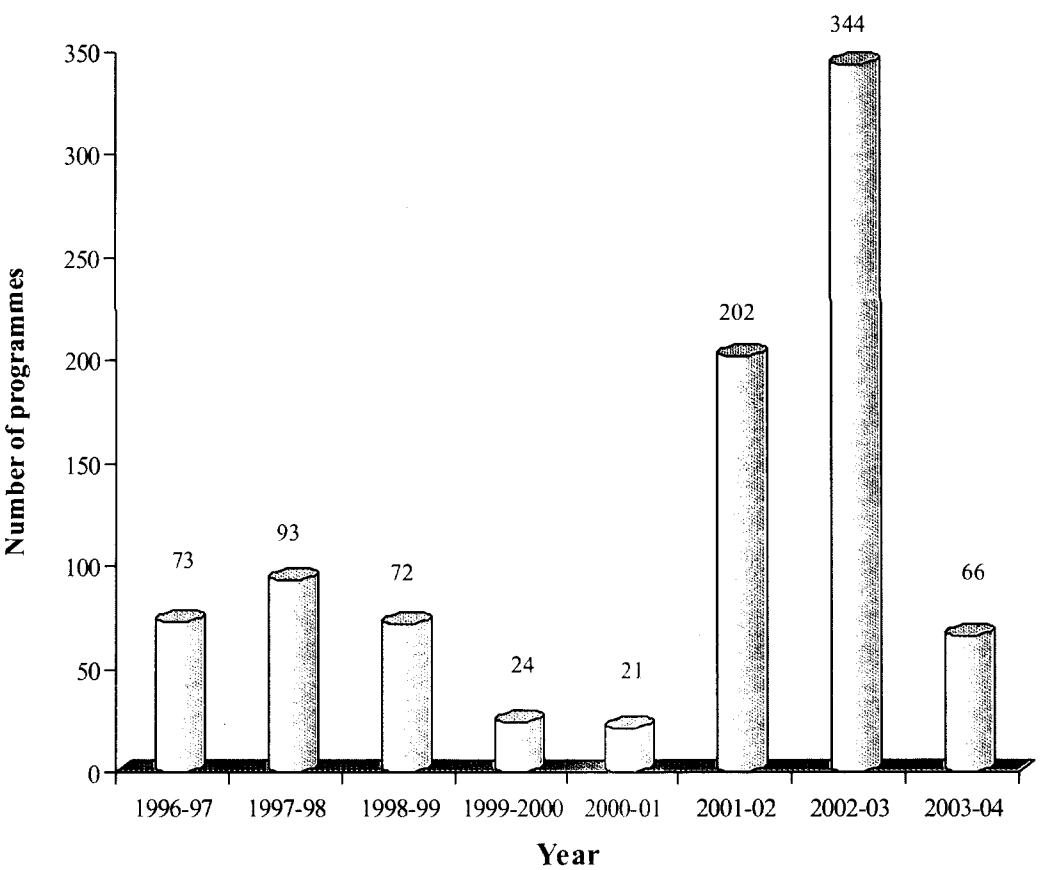
The AICTE has instituted an accreditation program to ensure quality education in all the technical institutes under its purview. The AICTE established the National Board of Accreditation (NBA) as an autonomous statutory body under section 10(u) of the AICTE Act (Fig. 4.16). The NBA has been given the responsibility to periodically conduct evaluation of technical institutions and their progress on the basis of guidelines, norms and standards laid down by it. Accreditation is based on an assessment of the physical infrastructure, availability of competent and qualified faculty, teaching learning process being followed, research and development work being carried out, placement of students and other aspects of relevance. Institutions can apply for accreditation any time after two batches of students in each program have passed out. Accreditation by the AICTE, which is based on the report of the expert committee members appointed to carry out the above task, has now been streamlined. Accreditation is now based on a marking system on a 1000 point scale. The validity of accreditation is 5 years for those programs obtaining more than 750 marks out of 1000 and 3 years for those graded between 650 and 750 points which meet the minimum criteria but still have marginal deficiencies.

Fig. 4.16 : STATUTORY POWERS OF NATIONAL BOARD OF ACCREDITATION



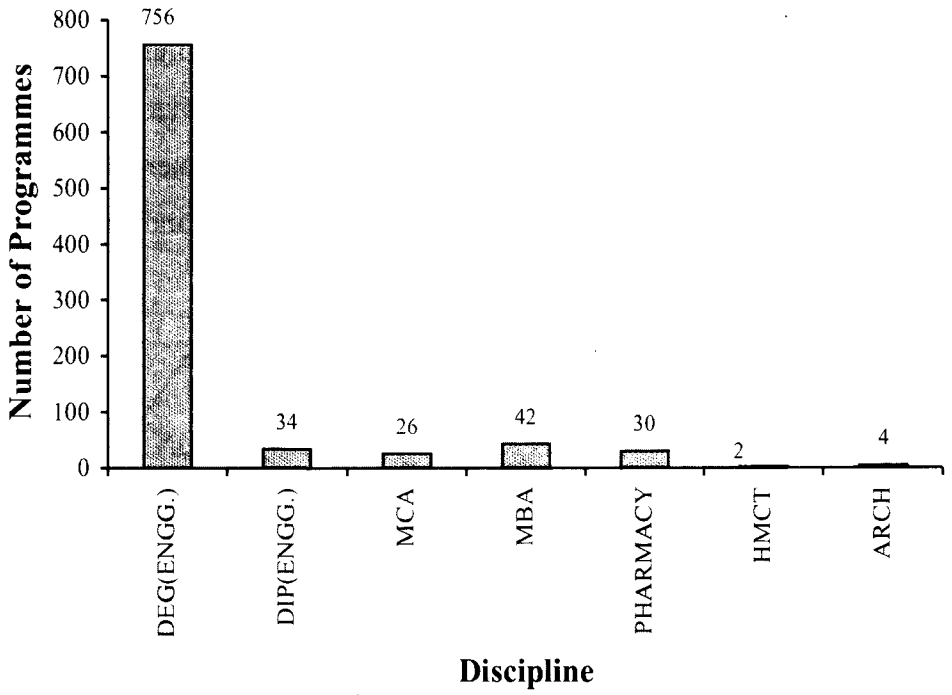
As on May 2003, only 895 programs from 202 institutions (Figures 4.17, 4.18, 4.19) have been accredited as against a total of about 14,000 programs in 3589 approved UG & PG institutions & 1608 approved diploma institutions. 53 of these are Government and aided institutions (9.3%) out of a total of 567 such institutions and the rest 149 are private institutions (4.9%) out of a total of 3022 institutions at UG & PG level. What is even more glaring is that out of the 53 government institutions, 12 are REC/ NITS. It is a matter of great concern to find that over 90% of technical and engineering graduates are studying in non-accredited institutions.

Fig. 4.17 : YEAR-WISE GROWTH IN ACCREDITATION AS ON MAY 7, 2003



Source: Directory of Accredited Programmes

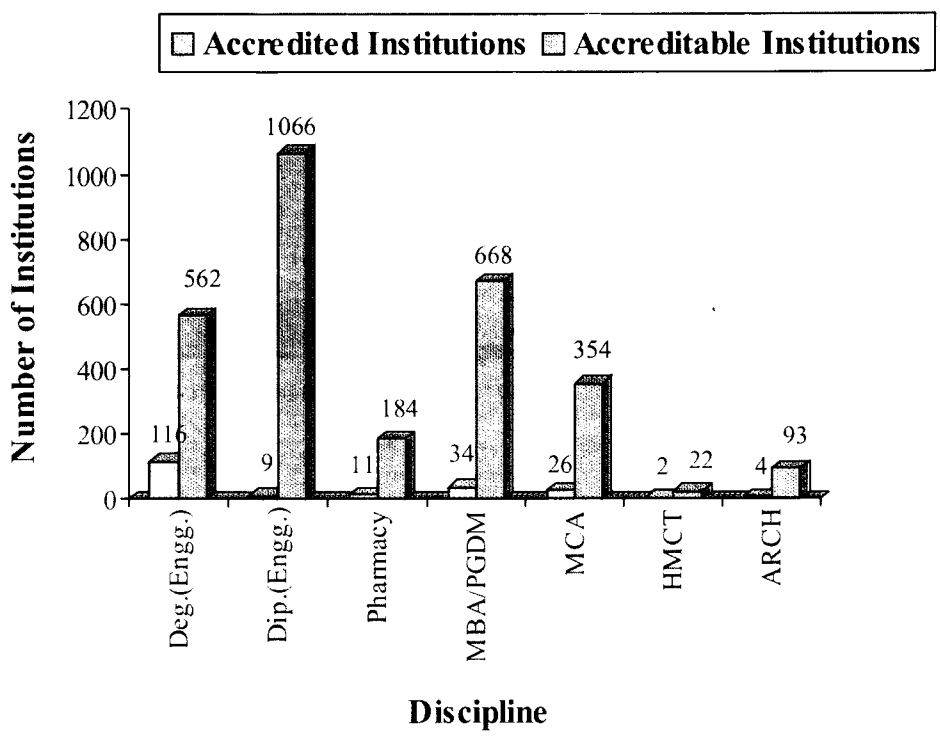
Fig. 4.18 : STATISTICS OF ACCREDITED PROGRAMMES IN DIFFERENT DISCIPLINES AS ON MAY 7, 2003



Total Number of Accredited Programmes = 895

Source: Directory of Accredited Programmes

Fig. 4.19 : STATISTICS OF ACTUAL ACCREDITED INSTITUTIONS AGAINST ACCREDITABLE INSTITUTIONS AS ON MAY 7, 2003



Source: (i) Directory of Accredited Programmes (ii) AICTE Annual Reports

Since many institutions are of recent origin, the number of institutions/programs coming up for accreditation will be quite large in the coming years. Even after the initial rush for accreditation ceases, one fifth of the total number of programmes i.e. at least 3,000 – 4,000 programmes, on an average, will come up for re-accreditation every year, which would mean a requirement of 12,000 experts and 36,000 expert days every year. The Committee feels that such a gigantic task is well beyond the capacity of the AICTE, unless accreditation process is simplified and streamlined without compromising on the rigour of the process.

Accreditation, being a very important activity, must be brought under the direct supervision of a separate Vice-Chairman with adequate supporting staff. It is necessary to forge a better understanding with Universities and the UGC, and wherever the AICTE and the University concerned should jointly carry out possible accreditation. Except in the case of unaccredited new programmes, accreditation may be carried out institution wise, through 3 or 4 appropriate experts who can cover all the major programmes. Once a new programme gets accredited it becomes a part of the institution accreditation process. A national register of experts from IIT's, NIT's, Universities, research institutions, industry experts, reputed fellows of professional societies and retired eminent teachers must be drawn up and updated once in two years, to facilitate easy identification and appointment of expert teams. Since the task is Herculean, the Committee recommends accreditation for all programs scoring over 650 be given for a duration of 5 years, with the specific clause that those scoring between 650 and 750 will not be reaccredited after 5 years unless they improve their score to 750 or above, by overcoming the marginal deficiencies pointed out to them during the first exercise.

The Committee suggests that accreditation must also take into account additional features such as the percentage of the students passing in the examinations, their placement record, quality of linkage of the institutions with industries and research establishments etc. Institutions, which are accredited, must be put on a web and well advertised to make students as well as their parents aware of the quality of institutions they are joining. Those institutions, which do not get accredited, must be severely warned and given two years to enable them to make up the shortfalls and get accredited. Those, which fail even after the grace period of two years, should be de-recognized by the AICTE. The committee is of the firm opinion that employment of such strict measures alone can ensure the quality of education, being imparted by the institutions.

4.4 Boards of Studies

The AICTE Act provides for the establishment of Boards of Studies, which shall advise the Executive Committee on academic matters falling in their respective areas of responsibility including norms, standards,

model curricula, model facilities and structure of courses. Accordingly, following All India Boards of Studies have been set up and are functioning :

1) All India Board of Vocational Education

2) All India Board of Technician Education

3) All India Board of Undergraduate Studies in Engineering and Technology

4) All India Board of Post graduate Education and Research in Engineering and Technology

5) All India Board of Management Studies

6) All India Board of Hotel Management and Catering Technology

7) All India Board of Information Technology

8) All India Board of Architecture and Town Planning Education

9) All India Board of Pharmacy Education

In addition to this, the AICTE has constituted four Advisory Boards also to advise the Executive Committee on academic matters including norms and standards, model curricula, model facilities, structure of courses etc.

1) Board of Industry Institute Interaction

2) Board of Research & Institutional Development

3) Board of Faculty Development

4) Board of Planning of Technical Education

These Boards are expected to provide guidelines on all academic matters including the duration of each course, contact hours, credit rating criteria, evaluation of students and framing of model curriculum in various disciplines. By naming the curriculum as a model curriculum, the AICTE has made it clear that these are only broad guidelines and Universities as well as institutions have the flexibility and freedom to make modifications, add or delete as required without diluting the overall scope, spirit and standards of the laid down syllabi. The Committee urges the AICTE to prepare model syllabus for all subjects including those disciplines, which have not been dealt with and give wide publicity to them. The Committee also strongly recommends that

the AICTE institute mechanisms such as standing committees of experts in each discipline, drawn from universities, institutions and industries to update the syllabus once every two years to prevent obsolescence. The Committee urges the AICTE and its Regional Committees to have a detailed dialogue with the Universities to ensure that the model syllabus published by the AICTE is consistent with the prescribed syllabus of the University itself based on which the students are finally examined and evaluated. The AICTE must closely interact with the various professional councils, regarding the syllabi, practical experience etc., to ensure that the graduating engineers do not have any hurdles in getting them registered with their respective professional councils.

An All India Board of Studies is an academic advisory body – not an executive body. Its tasks are to make recommendations on academic matters to the AICTE Executive Committee, which in turn should deliberate and decide, accept, reject or modify its recommendations. It is important, however, that the recommendations are placed on the agenda of the Executive Committee for its perusal and decision. Also, given that the Boards consist of eminent people in the relevant discipline, each Board should be able to choose the academic issues it considers important to deliberate. The Executive Committee should consider the Boards as a high level advisory resource and generally rely on them to examine academic issues in depth and give their considered opinion, instead of appointing separate committees on specific academic issues. Further, unless there are strong academic reasons, the recommendations of the Board on academic matters should be accepted as a matter of course. The AICTE needs to build a tradition whereby the Boards' recommendations are accepted unless in the judgment of the Executive Committee these contravene the purpose of the AICTE.

Judging from the broad role assigned to the Boards in the Act, it would appear that the responsibility of each subject Board is to address the following issues:

i) To review current status of educational programmes in the subject, evolve policy for enlarging programmes of high quality and restraining those which do not meet the minimum norms and standards stipulated by the AICTE.

ii) To evolve a strategy for upgrading institutions dealing with the subject, approved by the AICTE but not meeting the norms and standards prescribed by it. Contributing thoughts and ideas towards the promotion of quality improvement is an important expectation from the Boards.

iii) To identify research priorities in their area of concern and make recommendations thereon so that the Executive Committee may take decision on related aspects such as funding by the AICTE.

iv) To review existing curriculum, benchmark it with the best available in the world and recommend changes in the curriculum by adding, modifying, either the required courses or elective courses.

v) To review the faculty manpower picture in the relevant discipline at the national level and suggest strategies, which can be used for meeting the shortage or for development of the faculty.

vi) To suggest an approach for supporting subject based conferences and seminars besides providing opportunities to faculty to participate in relevant international conferences.

vii) To suggest a strategy for enabling institutions to have an effective interface with industry or other stakeholders.

The above roles should be discussed by the Executive Committee and adopted formally. Thereafter the Boards should be briefed of their role.

The Board of Studies should be expected to take a holistic view on the subject, recognizing that academic advancement of a discipline depends on a whole set of administrative and promotional measures besides purely academic. Their deliberations on academic issues should provide inputs to others who are more directly concerned with these other dimensions. Equally, information on such aspects should flow to the Boards to enable them to discuss academic issues in a realistic environment. It is also important that a stable secretariat support is provided to the Boards, to enable them to carry out their tasks and effectively follow up actions where needed.

It is recommended that the Boards should be made more autonomous in relation to their academic functioning. In order to continually renew the boards without losing the institutional memory, one third of the members may be retired at the end of each year by rotation and replaced with new members. A stable secretariat support should be made available to the Board so that it can be ensured that there is continuity of concerns and suitable follow up can be taken.

The interaction with societies like (i) Architecture and Town Planning Council of India (ii) Pharmaceutical Council of India (iii) IGNOU, UGC and other national agencies is of great importance in forging a healthy relationship between the AICTE, which is in charge of technical education and professional societies which lay down the norms for practicing these vocations. These are elaborated in Chapter – 7.

4.5 Functioning of Regional Committees

The Review Committee is pleased to note that the Regional Committees have been active in carrying ou their tasks expeditiously, even though they seem to be concentrating only on approvals and accreditation proces

and not very much on academic evaluation. The AICTE should decentralize and substantially strengthen and empower the Regional Committee. The Director of the Regional Office should be a full time appointee of the AICTE. He must be a person of high academic qualification and integrity, preferably from outside the region. The AICTE should constitute an expert committee of not more than eight people drawn from academic, research and industrial fields covering different disciplines within the purview of the AICTE, under the Chairmanship of a highly reputed person of national stature in technical education. The expert committee should advise the Regional Office on all academic and administrative issues including approval, intake and accreditation of institutions. The Director of the Regional Office should act as the convener of the expert committee.

The Regional Office should be fully empowered to issue approvals, accreditation etc. for all institutions within the region. In case of disputes, the matter would be referred to the AICTE Headquarters. This will substantially reduce the workload at the AICTE Headquarters that needs to only entertain complaints, if any, and act as an Appellate Authority. The AICTE chairman should have a meeting, at least twice a year, with the concerned Vice Chairman, Directors of the Regional Offices and the Chairmen of the Regional Committees to review the performance of the system and take all necessary actions for its smooth functioning.

4.6 Administrative Functioning

4.6.1 Appointment of Personnel at the AICTE Headquarters and its Regional Subsidiaries

The present practice of appointing people only on deputation in both the AICTE HQ and its Regional Offices is responsible for most of the vociferous complaints from various institutions including delay in obtaining decisions. Short term appointment of both academic and non-academic persons to various positions has resulted in lack of continuity when the deputationists go back after their stint in the AICTE, leaving the new incumbents to learn the system all over again. Most often there is a considerable time gap between the incumbent officers reverting to their parent organizations at the end of their deputation and the new incumbents joining the AICTE.

The Committee strongly recommends that the practice of relying on short-term deputationists alone needs to be stopped with immediate effect. The AICTE must be allowed to have at least 50% of the staff on permanent placement and the remaining to be met through deputation / contract appointment. Even then, provision should be made to ensure at least 3 months of overlap between the outgoing and incoming incumbents to ensure continuity and smooth running of the AICTE operations.

4.6.2 Administrative Structure

In order to decentralize the power, streamline the organization and strengthen the working culture o the AICTE, the Committee recommends the following structure for the AICTE HQ at Delhi and the Regiona Offices.

The AICTE HQ at Delhi

Chairman AICTE

Vice Chairman Planning	Vice Chairman Quality Assurance	Vice Chairman Promotional Schemes	Member – Secretary Administration
Assessment of Manpower	Faculty development	Schemes including model curriculum development	General administration
Approval to start UG/ PG programs	Accreditation	Liaison with state governments, UGC and other statutory bodies	Funding
Networking of academic institutions	Review of norms & standards	Distance education	Promotion of industries
Steps for stopping commercialization of education	Promotion of autonomy in technical institutions		The AICTE linkage

Apart from the administrative restructuring recommended above, the following issues need to be addressed at the HQs:

a) Most of the powers are vested in the Chairman and in the Member Secretary. There should be more delegation of powers to the proposed Vice Chairmen and further, to the officers below Regulations may be framed accordingly.

b) There should be a senior administrative officer in position who should attend to the administration house keeping and coordination between bureaus in so far as holding of meetings, etc. are concerned To the extent possible, the senior technical officers, should be left free to attend to the technica aspects of the areas allocated to them.

c) Officers at all levels should not be shifted around and should be fully accountable for the area assigned to him / her, as their frequent shifting is not in the interest of administration. If there is a need to shift anybody, it should be according to a transparent transfer / placement policy.

d) Steps should be taken to arrange for replacements well in time before the tenure of present incumbents end so that there is no gap in postings. In fact the new incumbent should take charge from his / her predecessor with a proper briefing note, handing over of listed files etc. This is in the interest of maintaining the memory of the organization and fixing accountability of the officers. Functionaries on contract are relieved on the day their contract ends but are allowed to apply for the same post again. This leads to a gap of few weeks before the same incumbent rejoins the same post. To avoid the waste of time, and the harassment to the incumbent, the Committee strongly recommends that if the said officer is good and needed, his contract should be extended well in time with approval from his parent organization, and the post need not be re-advertised.

e) The technical officers below the Vice Chairmen should have clearly defined duties assigned to them so that their performance can be appraised accordingly.

4.6.3 Regional Committees

Director		
Joint Director Planning & Administration	**Joint Director Quality Assurance**	**Joint Director Schemes**
Assessment of Manpower	Accreditation	Administration of schemes
Approvals	Promotion of autonomous institutes	Distance education
Liaison with industries		

The Committee recommends that the Chairman of the AICTE should be in the scale of Secretaries and Vice Chairmen at the AICTE Headquarters should be in the scale of Additional Secretaries to the Government of India. The Directors of the Regional Offices and at Headquarters should be in the scale of Joint Secretaries to the Government of India. Care should be taken, to provide adequate representation to all major disciplines under the purview of the AICTE, in the appointment of senior officials at the level of Chairman, Vice-Chairmen, Directors and Joint Directors. The number, position and emoluments of other staff may be appropriately fixed at both the headquarters and at regional offices.

Appendix 4.1

REPORT OF SUB GROUP 1 OF THE ADVISORY BOARD OF FACULTY DEVELOPMENT OF AICTE

TECH NET
(TECHNICAL EDUCATION NETWORK)

1. CONSTITUTION OF SUB GROUP No. 1

1.	Prof. M. S. Ananth, Director, IIT, Chennai	- Chairman
2.	Prof. K. Krishna Kumar, Chief Coordinator QIP, IIT, Kanpur	- Member
3.	Prof. Joe Philip, Director, XIME, Bangalore	- Member

2. TERMS OF REFERENCE (TOR)

- Use of latest communication technologies/media in faculty development the scope of the AICTE-ERNET MOU and projects of networking of technical institutions.

- Identification of suitable content provider.

3. INTRODUCTION

The demand for undergraduate engineering education in India is estimated at 500,000 and far exceeds the available capacity of 300,000. A recent report (Rama Rao Committee Report) has noted the marked drop in the number of postgraduate, especially Ph.D. engineering students since the late 1980s. Specifically there are only about 10,000 PG students (In contrast the US has about 90,000 UG and 90,000 PG students in engineering). Since only a fraction of the PG students will enter the teaching profession. This dismal ratio of PG to UG students in India is a cause for deep concern. The non-availability of teachers has infact forced

ICTE to present the appointment of B.Tech/BE grandaunts as teachers in the recognized colleges in the ɔuntry. Although the central and state governments have initiated a variety of measures to increase the umber of engineering and IT trained graduates, such increases will be slow and costly, particularly in view of ıe drop in the number of engineers Ph.Ds. Moreover, there are questions of quality. (One estimate suggests ıat only about 10% of the engineering undergraduates outside the IITs are at institutions providing good ıality education.

The immediate solution to this crisis lies in the use of developments in Communication Technology to ıcrease the reach and the quality of engineering education in the country.

It is possible now to make well-designed courses available to engineering students all over India ırough satellite links and to expose these students to excellent teachers. This report outlines a cost-effect :heme for achieving these objectives and is essentially a reproduction of the report prepared by Prof. U.R. ao under the title TECH NET (Technical Education Network).

. STRATEGY

(a) Totally syllabus based educational broadcasting to colleges, institutions, universities and individual students by establishing virtual classrooms using satellite link.

(b) Content production by nest teachers/experts identified by the AICTE from IITs/IISc, other programme faculty in engineering colleges with programs that has been accredited by NBA with a rating of 'A' grade.

(c) Content producing in centralized locations, E.G., studio in Delhi to be expanded to cover other sites e.g., IITs, IISc

(d) Interconnectivity through dial up line or e-mail to begin with and later through satellite link.

(e) Content uplink from a central hub at Delhi, on a leased basis to start with and later, if required, from an independent set up established by the AICTE

(f) Responsibilities of the AICTE

(i) Identification of experts, syllabus of courses

(ii) Preparation of lectures with the help of experts

(iii) Providing studio facilities for making transmission ready, discs, to start with by leasi either private or Doordarshan studio and later by building its own studio, if necessa

(iv) Unlinking via satellite in an encrypted mode, on a nation-wide basis from a leased h (eg. HCL hub at NOIDA) or using Doordarshan facilities or IGNOU facilities

(v) Arrangements to answer questions, which can be clubbed together till satellite interacti links are made available

(vi) Charge and collect nominal fees from colleges/institutions to meet part of the cost.

(g) Responsibility of Colleges/Institutions

(i) Set up 3 VSAT systems/DVB, which can be upgraded, to DVB/RCS at a later da to provide students along with their teacher access to best class room instruction

(ii) Pay subscription fee to AICTE on an annual basis

(iii) Collect subscription from individual students to cover their entire cost

(iv) Access lecture notes using the VSAT network and distribute to students at cost

(h) Responsibility of Students

(i) Pay an annual fee to the institution for receiving distance education benefit.

(ii) If possible also buy a World Space receiver, which permits access to these lectur at any convenient time/place of their choice.

. SCHEME

Start with 3 channels (each channel carrying 6 subjects). Nation wide transmission of 4 lectures each ıy, 2 in the morning and 2 in the evening (0700-0745 hrs., 0745-0830 hrs. and 1900-1945 and 1945-2030 s.). Each channel will transmit 2 lectures on 2 subjects per day or 2 lectures each on 6 subjects in 3 days. In week of 6 days, each channel will transmit 4 lectures each on 6 subjects. In a year 4 x 52 = 208 lectures each ı 6 subjects can be transmitted nationwide. With 3 channels we can cover 18 subjects.

Group A	**Group B**	**Group C**
Channel – 1	**Channel – 2**	**Channel – 3**
Civil Engineering	Electrical Engineering & Electricals	Business Administration
Architecture	Electronics & Communication	Hotel Management
Mechanical Engineering	Metallurgical Engineering	Production Engineering
Industrial Engineering	Mining Engineering	Industrial & Control
Chemical Engineering	Computer Science	Agricultural Engineering
Pharmacy	Information Technology	Textile Technology

Scheme	**0700 – 0745hrs**	**0745 – 0835hrs**	**1900 – 1945hrs**	**1945 – 2030 hrs.**
Monday	Civil	Architecture	Civil	Architecture
Tuesday	Mechanical	Industrial	Mechanical	Industrial
Wednesday	Chemical	Pharmacy	Chemical	Pharmacy

Same scheme repeated for Thursday, Friday & Saturday. Similar scheme on 2nd (Group B Subjects) d 3rd (Group C Subjects) channels.

COST ASPECTS

6.1 Cost of AICTE

(a) Cost for Preparation of Lectures

We assign 12 lectures to be delivered by each expert in the subject, which means we need to identify 17 experts for each subject. The twelve Lectures can all be recorded in two days at a central studio (in Delhi) and unlinked any time, as required to the satellite for nation wide broadcast. Reimbursement for each lecture for text preparation.

TA + DA (Average)	Rs. 20,000.00	
Honorarium (Rs. 1,000.00/Lecture)	Rs. 12,000.00	
Cost for each subject (17 Lectures)	17 x 32,000.00 =	5.5 Lakhs
Total cost for 18 subjects (18 subjects)	18 x 5.5 = 99 lakhs ~ 1 Crore	

Even if we have to update the course iin 5 years, the cost/year ~ 20 Lakhs

(b) Studio

If we have to build a studio it would cost about 10 crores. To start with it is possi to hire a studio and record the lectures on disks.

(c) Uplink cost (4 hours/day). It is possible to lease the hubs (HCL has one in NOID Lease charge for the hub for transmission is 1 crore/year

(d) It is best to use DVB (Digital Video Broadcasting) technology. To start with interact link will be through e-mail, dial-up line and later DVB can be upgraded to DVB/R (Return Channel Satellite). For 3 channels in the digital mode, ¼ Ku-band transpond adequate. Lease charge for ¼ transponder ~ 1 crire/year. Lecture notes/materials be accessed using the same system and can be provided to students at a nominal co

(e) **Cost of AICTE**

	Recurring	**Non-Recurring**
Lecture Preparation	20 Lakhs	1 Crore (Start)
Studio Lease Charge	2 Crore	10 Crores
Uplink Cost	2 crore	—
X Ponder	1 crore	—
	5 Crore Recurring +	11 crores (Non-Recurring)

6.2 Cost of Education Institution

	Recurring	**Non-Recurring**
VSAT Set up 3 (Vsat's /College) DVB	1 Lakh	3 Lakh
Dial-up/lease line	2 Lakh	—
Building/accessories	2 Lakh	—
Fess to be paid to AICTE (for 3 channels)	3 Lakh	—
	8 Lakhs Recurring +	3 Lakhs (Non-Recurring)

If DVB/RCS is used each VSAT set up would cost about 5 lakhs which means non recurring cost will go up to 15 lakhs.

Total cost is 8 lakhs+ 3 lakhs =
(15 lakhs ammortised over 5 years = } Rs. 11 Lakhs/Year

6.3 Cost of students

Each college/institution has around 1200 students Cost per student Rs. 1,000.00 each. Revenue earned Rs. 12 Lakhs.

6.4 In addition these lessons could also be broadcast on World Space receiver, which is least expensive. Slow scan video provides the ability to show slides. The students need to buy a World Space receiver, which can be connected to any PC off-line and used. Uplinking from Singapore can be done by posting lectures from Delhi to Singapore via leased landline.

CHAPTER 5

SPECIAL ISSUES IN MANAGEMENT, PHARMACY AND ARCHITECTURE EDUCATION

5.1 Management Education

Management education has grown rapidly in recent years, with 930 institutions at present, which is second only to the USA. This rapid expansion has brought up a number of issues which impact on the quality of management education. These issues are briefly discussed below, along with suggestions for dealing with them.

5.1.1 Focus of Management Education

With some honorable exceptions, management education is concerned almost exclusively with the corporate business sector. The organized sector, of which the corporate sector is only a part, contributes only 7% to employment and less than 40% to the GDP. The non-corporate sector, including public systems and Non-Government sector, needs major revamping in terms of new more efficient management approaches and systems. The unorganized sector, which provides more than 93% of employment and contributes more than 60% of the national GDP, suffers from poor productivity, and needs attention of management education. There is a tremendous need and unrealized potential for management education making contribution to non-corporate and unorganised sectors, and public systems. Management education, accordingly, needs to (i) develop new education and training programmes including entrepreneurship for such under-served sector (for example, agriculture; transport; tourism; PSUs; energy; government administrative systems; social and service sectors like education, health and environment; informal production and service sector; etc) , and (ii) institute research into understanding them and develop robust strategies for making suitable interventions in them.

The AICTE may set up an expert group to study the needs of these sectors and suggest specific programmes that should be launched in management education sector. The group may also suggest the measures the AICTE can take up to promote these initiatives.

5.1.2 Diversity of offerings

Management education by and large is preoccupied with a two-year post-graduate programme of initial education. Considering the need for managing diverse and rapidly changing technology, ever changing

market situations, increasing consumer demand for quality, etc, it is important that a variety of programmes is offered for practicing executives. Some of these could be:

- Intensive programme for executives with 3 to 5 years supervisory/ managerial experience
- Intensive and long duration programmes for senior executives, referred to as executive MBAs
- Short term specialized programmes in functional areas such as sales, marketing, accounting, human resource development, technology management, etc, and industry specific programmes such as tourism, hotel management, trading, and merchandising.
- International programmes aimed at participants' abroad, which are in line with their specialized needs and prior preparation.

Even in initial education there is a need for exploring greater diversity, for example, undergraduate programmes in management. The AICTE currently does not concern itself with undergraduate programmes or with part-time programmes in management. With many such programmes coming up, both nationally and abroad, the AICTE should take up undergraduate management programmes under its purview, consistent with its charter.

5.1.3 Education Material Development

In the early years of management education, management schools relied completely on study material borrowed from American and British sources. Management education has to be culturally contextualised. Accordingly, study material and case studies based on Indian experience, Indian management practices, both current and traditional, and Indian cultural values, become an important requirement for providing contextually relevant education. Although some effort was made initially by a small number of institutions to develop Indian cases and teaching material, the output is not in consonance either with need or the size of management faculty. Furthermore, the material available is totally inadequate to support a variety of teaching methodologies used in management teaching such as, case studies, business-games, problem solving assignments, in-basket exercises, role play and use of visual aids and e-platforms. Such material has to be developed through field research. Teachers have to be trained in both developing such material and using them effectively in their educational transactions.

It is recommended that the AICTE may develop and institute a specific scheme for stimulating preparation of this wide range of educational material in order that management schools can provide high quality and relevant management education.

5.1.4 Integrating Indian Cultural Values in Management Education

Reference has already been made earlier to the need for cultural context of management educatio Many countries like Japan, France, Germany, China, Indonesia and Korea have adopted the received ideas i management to suit their own cultural patterns. Despite a rich and long tradition of management, India has y to undertake a comprehensive exercise in this respect and attempt a blend of the best elsewhere with the be in the Indian tradition. Since management patterns are influenced a great deal by the value systems prevalent i the society and dominant behavioural patterns, a study should be undertaken to identify the dominant socio psychological characteristics of Indian cultural values. Management education should take these into accou and evolve a system of management education that is at once modern and relevant to our own genius.

5.1.5 Faculty Development

Faculty shortages have become more acute with rapid expansion of management education. This poi has been referred to earlier as well (Section 4.2). This task is complicated by the fact that only a very fe institutions run a Ph. D. programme in management. IIMs started a Fellowship Programme many years ag but the total output from these programmes remains very low. The AICTE should consider encouraging bette endowed institutions to start Fellowship/ Ph.D programmes. Also, there is no real counterpart in managemen education of the existing QIP programme in engineering. The AICTE should consider launching a QI programme for management teachers as well.

There is another dimension to faculty development, which is perhaps peculiar to management educatio Since management is underpinned by several disciplines such as economics, commerce, psychology and I often faculty, which has specialized in these disciplines rather than formally in management, is recruited to teac management courses. Even though these disciplines are important to management education, these need to b taught as applied disciplines in the context of their application to solving managerial problems. In many case in the absence of a conscious effort to develop teachers so that they learn how to apply these individu disciplines to management, they continue to teach their individual disciplines. In order that they truly becon teachers of management it would be necessary to organize special teacher training programmes, to conv them into teachers of management. Again a few IIMs made some efforts in this direction, but the task is lar and a special programme is needed to deal with this issue. The AICTE should consider launching such programme at the earliest. Leading institutions in major cities could be asked to host such a programme so th

teachers from nearby institutions can take up a series of short modular programmes in the evening when they would be free from their normal teaching commitments.

5.1.6 Research in Management

Research in management is necessary for improving the practice and teaching of management. With marked exceptions, the quantity and quality of research undertaken by management institutions has been inadequate. Research in management area suffers from many handicaps. Institutions hardly have motivated individuals to undertake research, nor do they reward them for research-based publications. Teaching loads in many institutions are heavy leaving little time for research. Funding research projects has been generally difficult for institutions. Clients too have shown no real interest in either supporting research or raising issues requiring research.

It is recommended that the AICTE should encourage research activity by management institutions and expand its support for research to them. The existing scheme of R&D, as pointed out elsewhere has not served the management institutions sufficiently. It may be desirable to develop a separate scheme for research support to management institutions; its features would take into account the special requirements of management research, which are not as heavy on equipment component as engineering but much more on travel and staff component for the purposes of surveying and interviewing key-respondents. The AICTE should aim at supporting at least 100 such research projects each year. Projects whose primary purpose is to develop case-study material for teaching could also be supported.

The AICTE should specify the maximum contact hours in teaching in management education. It is also important to ensure that the faculty load takes research into account. The AICTE may wish to examine and specify the faculty time that should be devoted to and counted towards research. In the same spirit, the AICTE guidelines could stipulate that research output and publications should be given significant weightage, for promotion to higher levels.

5.1.7 Forecasting Management Manpower Requirement and Analyzing the Labour Market for Management Professionals.

Just as in engineering, it is important to ensure that there is as little mismatch between supply and demand for managerial manpower as possible. The National Technical Manpower Information System supported

by the AICTE does not cover management at present. It is recommended that NTMIS should be expanded into management education as well and the proposed CHRIS be given the responsibility to operationalise it.

5.1.8 Accreditation of Management Education Programmes.

Very few management education programmes have been accredited to date. As a means of quality assurance, the value of early accreditation of management programmes by NBA can hardly be overemphasized. Accreditation needs to be made mandatory and be expedited. It is also understood that the matter of permitting PG Diploma is receiving consideration, as several committees appointed to look into this issue have recommended revival and continuation of PGDM programmes. It is suggested that the AICTE should take a positive view and revive PGDM programmes, considering that most of the top management institutions only offer PGDM programmes. However, most of the university institutions, not being bound by the AICTE norms, have faculty strength much less than that recommended by the AICTE.

In the interest of promoting quality of management education it is recommended that (i) quality of the entire management education system, whether under the university or in PGDM institutions should be the concern of the NBA (ii) accreditation of management programmes should be expedited and, if need be, NBA strengthened for the purpose (iii) the AICTE norms should apply to all institutions in terms of faculty and other criteria which have a bearing on quality (iv) PGDM programmes by autonomous institutions which meet the AICTE criteria of approval should be permitted in addition to MBA programmes.

5.1.9 Management Council of India

It has been suggested occasionally that a separate management council should be set up in order that management receives the same level of attention that engineering is perceived to receive in the AICTE at present. This would not be a desirable development. Close intrinsic interrelationship between management and engineering, particularly now that economic development is being driven more and more by technology and its successful management, would argue for keeping engineering and management education under the same umbrella. The very first Para of Chapter 6 on Technical Education in the 1986 National Policy on Education also brings out the need for coordinated development of the two. Management education should, therefore, remain a part of the AICTE and a separate Management Council is not desirable. To the extent that management needs greater attention within the AICTE, the Council should examine how this can be done to dispel the perception mentioned above.

5.1.10 National Academy of Management

The rationale and benefits of an academy have been brought out elsewhere in the context of the Indian National Academy of Engineering. For the same reasons it is proposed that a National Academy of Management should be established and it should work in close cooperation with the AICTE on lines similar to the INAE. The AICTE should consider extending its support to the establishment of such an academy.

5.2 Pharmacy Education

5.2.1 Role of the AICTE in Pharmacy Education

Role of the AICTE in pharmacy education has been questioned from time to time on the ground that (i) Pharmacy is closer to the medical profession and hence should be within the purview of the Medical Council (ii) a Pharmacy Council already exists which also lays down educational norms, etc. It needs to be appreciated that pharmaceutical industry is technology intensive like any other manufacturing industry and needs technology oriented professionals. Further, bio-technology is crucial to the growth of pharmaceutical industry and bio-technology is an important technological area under the purview of the AICTE. Accordingly, pharmacy education should remain with the AICTE. It has also been explained elsewhere why all education matters should be with the AICTE and not with professional societies. In view of that pharmacy education should be planned, regulated and developed by the AICTE as per the AICTE Act. The dual control by the AICTE and the Pharmacy Council in educational matters has only created confusion and restricted the attention that the AICTE can legitimately pay to it. Norms and standards of the AICTE in respect of teacher student ratios, teacher qualifications, infrastructural requirements, etc., should apply to pharmacy institutions. However, the AICTE may involve and consult the PCI and professional bodies in the process of evolving its norms. Similarly accreditation of pharmacy programmes should be the responsibility of the NBA. Very few pharmacy institutions have been accredited so far; this needs to be expedited.

5.2.2 Development of Pharmacy Education

Issues of modernization, removal of obsolescence, research and development, faculty development, industry interaction, and accreditation apply to pharmacy with as much severity as they do in engineering.

Accordingly, it is suggested that due attention be given to the developmental needs of pharmacy and resources devoted to pharmacy be increased suitably.

5.3 Architecture, Town Planning, and Applied Arts Education

5.3.1 Role of the AICTE

Education is the responsibility of the AICTE and should be governed by the AICTE norms and procedures alone. However, consultation with CoA and other professional bodies is desirable. Applied arts are also under the AICTE. However, there is some confusion, possibly both within the AICTE and institutions outside, about the AICTE's precise role. It is suggested that the AICTE should clarify and elaborate its role vis-à-vis applied arts and develop a programme of action to fulfill its identified responsibility in this area.

5.3.2 Development of Architecture and Town Planning Education

There is need for greater diversification of offerings. Apart from adding more undergraduate programmes in town/physical planning in order to improve the physical environment of habitations which is under considerable stress at present, post graduate programmes need to be expanded and diversified into emerging areas like environmental planning and design, landscape architecture, urban development management, traffic and transport planning, architectural conservation, disaster management, etc. An expert committee may be set up by the AICTE to identify new areas in architecture and town planning where new programmes should be established/ expanded.

Other issues of development are similar to those cited in the case of pharmacy and require similar treatment.

5.4 Hotel Management and Catering Technology

Many institutions are operating without the approval of the AICTE or following its norms. An independent role played by the National Council for Hotel Management has complicated the position. Three-year

programmes are being run by many institutions, which are accepted by the industry, whereas the AICTE has stipulated a four-year programme. It is important that this confusion is resolved early. Irrespective of the duration of the courses, all technical education systems should come under the purview of the AICTE. The AICTE should also take a fresh look at and examine the possibility of applying uniform duration to all the management degree programs, in consultation with the industries and universities. Issues of new courses, curriculum, teacher development, accreditation, etc, have received little attention, perhaps as a result of the prevailing confusion. The AICTE should examine and determine its precise role and responsibility in this area and take suitable action accordingly.

CHAPTER 6

REVIEW OF THE AICTE SCHEMES

6.1 Preamble

Under its promotional role the AICTE has been operating a number of schemes since 1995. These are listed below:

1) Modernization and Removal of Obsolescence (MODROBS) primarily to equip technical institutions, laboratories and workshops with modern infrastructural facilities to enhance functional efficiency for teaching, training and research, with a maximum funding of Rs.15 lakhs over two years.

2) Research and Development (R&D) scheme for maintaining and accelerating the pace of technological developments and to encourage and promote general research capabilities of faculty members with a maximum funding of Rs.10 lakhs over three years.

3) Thrust Area Program in Technical Education (TAPTEC), to promote research in identified thrust areas such as remote sensing, satellite imaging, biotechnology, genetic engineering, virtual reality, optical fibre technology, nano-technology etc., with a maximum funding of Rs.20 lakhs over three years.

4) Nationally Coordinated Projects (NCP) to plan, coordinate and execute integrated R&D programs at national level, which can be undertaken by a group of institutions with clearly defined deliverables, in collaboration with high quality national institutions, such as IIT/IIM, NIT's etc., with a maximum funding of Rs.30 – 40 lakhs over 3 years.

5) Industry Institute Partnership Cell (IIPC) to establish Institute – Industry liaison by creating IIPC Cells to encourage consultancy, organize special lectures, study tours and visits with a maximum one time non-recurring grant of Rs.5 lakhs and an annual recurring grant of Rs.5 lakhs.

6) National Facilities in Engineering and Technology with Industrial Collaboration (NAFETIC) scheme to establish national level facilities in frontier areas of engineering and technology, in collaboration with industry, with a maximum funding of Rs.50 lakhs over 3 years with an equal contribution coming from industry.

7) Entrepreneurship and Management Development (EMD) scheme to encourage polytechnic students to consider self-employment and training in entrepreneurship and management with a maximum one time non-recurring grant of Rs.4 lakhs and annual recurring grant of Rs.4 lakhs.

8) Early Faculty Induction Programme (EFIP) to attract bright young and motivated undergraduate students to choose teaching profession as a career.

9) Quality Improvement Programme (QIP) to upgrade the expertise and capabilities of the faculty members of the degree level technical institutions in the country.

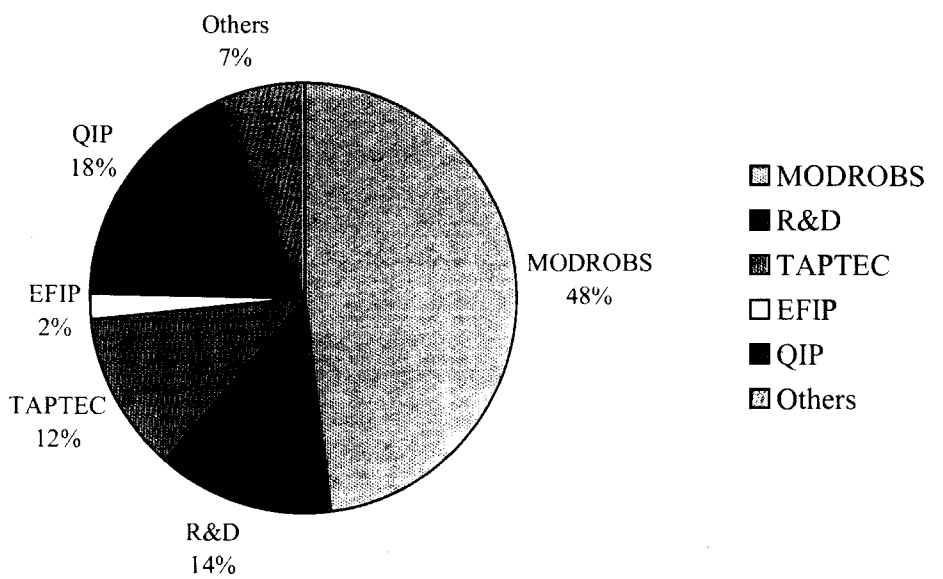
The AICTE has been spending approximately Rs.40 to Rs. 50 crores a year on these schemes, almost 50% is in support of MODROBS and about 14% on R&D and 12% on TAPTEC scheme. Table 6.1 gives a summary of the total grants released under various schemes. A review of the functioning of major schemes along with recommendations for change either in their scope or functioning is presented in the following sections:

Table 6.1 : TOTAL GRANTS RELEASED UNDER VARIOUS SCHEMES (IN LAKHS OF RUPEES) DURING 2000-2003

Year	MODROBS	R&D	TAPTEC	NCP	IIPC	NAFETIC	EMD	EFIP	QIP	Total
2000-2001	1037.68	643.66	404.52	15.00	72.00	1.00	30.00	142.40	895.10	3241.36
2001-2002	3690.45	793.08	532.80	27.50	337.21	2.50	85.10	89.10	600.54	6158.28
2002-2003	2217.20	517.82	782.27	3.00	178.53	130.00	66.54	64.95	1114.46	5074.77
Sub Total	**6945.33**	**1954.56**	**1719.59**	**45.50**	**587.74**	**133.50**	**181.64**	**296.45**	**2610.10**	**14474.41**

Source: (I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)
(ii) AICTE Records

Fig 6.1 : DISTRIBUTION OF GRANTS RELEASED UNDER VARIOUS SCHEMES DURING 2000-2003



6.2 Modernization and Removal of Obsolescence (MODROBS)

This scheme, originally started in the Ministry of Education during the sixth plan, made an impressive contribution to modernizing the then infrastructure of technical education institutions. Later, the scheme was passed on to the AICTE for implementation, after it became a statutory body. The AICTE Act required the AICTE "to allocate and disburse out of the funds of the Council such grants, on such terms and conditions as it may think fit to (i) technical institutions, and (ii) universities imparting technical education in coordination with the University Grants Commission". Strict interpretation of this provision would imply that the AICTE is expected to cover the total education system and not just a part of it.

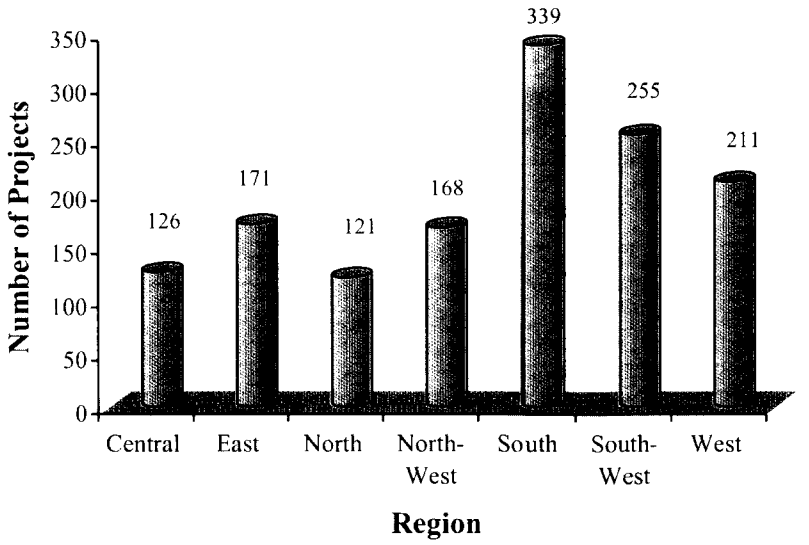
The AICTE needs to be complimented for disbursing nearly Rs.25 crores a year on an average, under MODROBS, R&D and TAPTEC schemes to many technical institutions including private institutions and those under the purview of the universities, which forms roughly 70% of its total budget allocated for various schemes (Table 6.2, Fig. 6.1). Even self-financing private sector institutions, which are accredited, have received funding under different schemes. Requirement of funds for modernization and removal of obsolescence cannot arise prior to the accreditation period, if private sector institutions have in fact built the basic infrastructure and facilities as required and get accredited well within 2 years after the passing out of the first batch of graduates. Since supporting low quality private institutions, will only encourage fly by night operators to indiscriminately start new institutions for commercial gains, the committee fully agrees with the stipulation of accreditation for making these institutions eligible for receiving funds from the AICTE in support of their modernization and removal of obsolescence.

Table 6.2 : PROJECTS SANCTIONED AND GRANTS RELEASED UNDER VARIOUS SCHEMES DURING 2000 - 2003

Year	MODROBS		R&D		TAPTEC		Total	
	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)
2000-2001	126	1,037.68	95	643.66	52	404.52	273	2,085.86
2001-2002	446	3,690.45	141	793.08	53	532.80	640	5,016.33
2002-2003	338	2,217.20	72	517.82	68	782.27	478	3,517.29
Sub-Total	**910**	**6,945.33**	**308**	**1,954.56**	**173**	**1,719.59**	**1,391**	**10,619.48**

Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

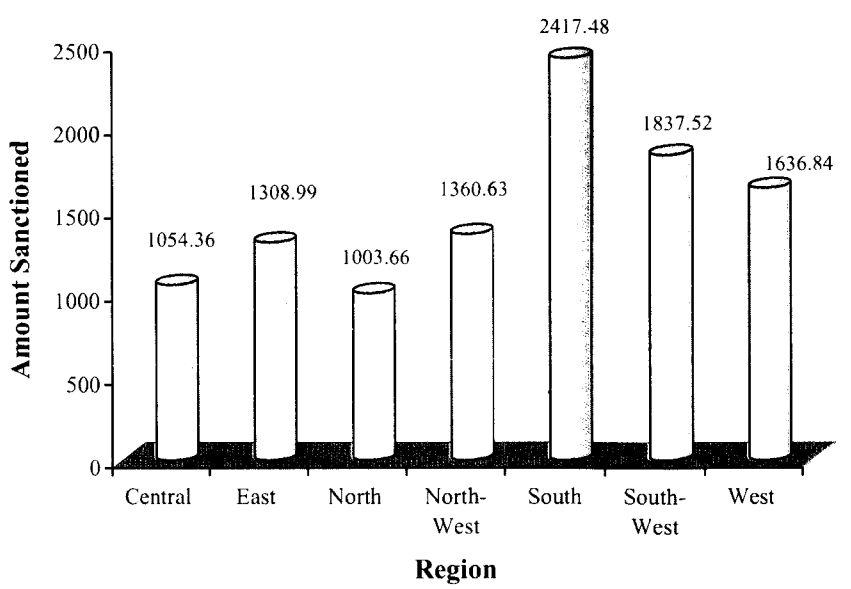
FIG. 6.2 : REGION-WISE PROJECTS SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000-2003



Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

So far only 519 institutions including university departments and private institutions, or just about 10% of the total number of institutions have benefitted from these schemes. This is largely due to the fact that the exponential proliferation of institutions has been largely during the last 4-5 years and they are yet to go through the process of accreditation. State-wise distribution of projects and funds under MODROBS, R&D and TAPTEC, likewise show that the larger share of funds has gone to the Southern States (Tables 6.3 and 6.4, Figs. 6.2 and 6.3). Table 6.5 and Fig. 6.4 show the region-wise distribution of grants, which is in line with the higher concentration of institutions in the South as indicated in Chapter 4 in Table 4.4(a & b).

Table 6.3 : REGION-WISE AMOUNT SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003



Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

Table 6.3 : REGION-WISE DISBUSRSEMENT OF GRANTS UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003 (AMOUNT IN RS. LAKHS)

Region	State	2000-01	2001-02	2002-03	Total	% of Total Grant Disbursed
Central	Chattisgarh	-	20.00	15.00	35.00	0.33
	Gujarat	107.55	457.21	171.43	736.19	6.93
	Madhya Pradesh	49.32	174.85	59.00	283.17	2.67
	Total	**156.87**	**652.06**	**245.43**	**1054.36**	**9.93**
East	Andaman & Nicobar	-	-	-	-	0.00
	Arunachal Pradesh	-	4.00	-	4.00	0.04
	Assam	50.02	58.10	59.15	167.27	1.57
	Jharkhand	14.25	62.85	38.95	116.05	1.10
	Manipur	13.00	30.00	-	43.00	0.40
	Nagaland	-	-	-	-	0.00
	Orissa	7.00	138.78	74.00	219.78	2.07
	Sikkim	-	-	-	-	0.00
	Tripura	-	34.00	-	34.00	0.32
	West Bengal	200.60	271.00	253.29	724.89	6.83
	Total	**284.87**	**598.73**	**425.39**	**1308.99**	**12.34**
North	Bihar	38.35	16.05	-	54.40	0.51
	Uttar Pradesh	202.93	339.65	258.68	801.26	7.55
	Uttranchal	-	148.00	-	148.00	1.39
	Total	**241.28**	**503.70**	**258.68**	**1003.66**	**9.45**
North-West	Chandigarh	6.20	84.65	53.00	143.85	1.35
	Delhi	70.25	141.00	83.00	294.25	2.77
	Haryana	33.00	48.15	37.22	118.37	1.11
	Himachal Pradesh	-	37.00	11.15	48.15	0.45
	Jammu & Kashmir	-	109.97	51.79	161.76	1.52
	Punjab	80.60	193.15	108.05	381.80	3.60
	Rajasthan	48.75	126.25	37.45	212.45	2.00
	Total	**238.80**	**740.17**	**381.66**	**1360.63**	**12.80**
South	Andhra Pradesh	184.30	200.25	485.95	870.50	8.20
	Pondicherry	39.63	27.00	29.80	96.43	0.91
	Tamil Nadu	374.77	595.02	480.76	1450.55	13.66
	Total	**598.70**	**822.27**	**996.51**	**2417.48**	**22.77**
South-West	Karnataka	194.70	723.65	607.29	1525.64	14.37
	Kerala	76.50	147.90	87.48	311.88	2.64
	Total	**271.20**	**871.55**	**694.77**	**1837.52**	**17.01**
West	Goa	21.00	23.00	10.50	54.50	0.51
	Maharashtra	273.14	804.85	504.35	1582.34	14.90
	Total	**294.14**	**827.85**	**514.85**	**1636.84**	**15.41**
	Total	**2085.86**	**5016.33**	**3517.29**	**10619.48**	-

Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

Table 6.4 : STATE-WISE NUMBER OF PROJECTS SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003

State	2000-01	2001-02	2002-03	Total	% of Total Projects
Andhra Pradesh	25	24	68	**117**	8.41
Andaman & Nicobar	-	-	-	**0**	0.00
Arunachal Pradesh	-	1	-	**1**	0.07
Assam	8	9	6	**23**	1.65
Bihar	6	3	-	**9**	0.65
Chandigarh	1	8	5	**14**	1.01
Chattisgarh	-	3	1	**4**	0.29
Delhi	9	15	8	**32**	2.30
Goa	2	3	2	**7**	0.50
Gujarat	14	53	23	**90**	6.47
Haryana	3	7	4	**14**	1.01
Himachal Pradesh	-	5	2	**7**	0.50
Jammu & Kashmir	-	15	6	**21**	1.51
Jharkhand	2	7	6	**15**	1.08
Karnataka	26	97	90	**213**	15.31
Kerala	7	22	13	**42**	3.02
Maharastra	34	103	67	**204**	14.67
Madhya Pradesh	7	18	7	**32**	2.30
Manipur	2	2	-	**4**	0.29
Nagaland	-		-	**0**	0.00
Orissa	2	22	11	**35**	2.52
Pondicherry	5	4	4	**13**	0.93
Punjab	14	24	14	**52**	3.74
Rajasthan	5	18	5	**28**	2.01
Sikkim	-	-	-	**0**	0.00
Tamilnadu	51	78	80	**209**	15.03
Tripura	-	4	-	**4**	0.29
Uttaranchal	-	16	-	**16**	1.15
Uttar Pradesh	24	40	32	**96**	6.90
West Bengal	26	39	24	**89**	6.40
TOTAL	**273**	**640**	**478**	**1,391**	**100.00**

Source: (I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)
(ii) AICTE Records

Fig. 6.4 (a) : REGION-WISE PROJECTS SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003

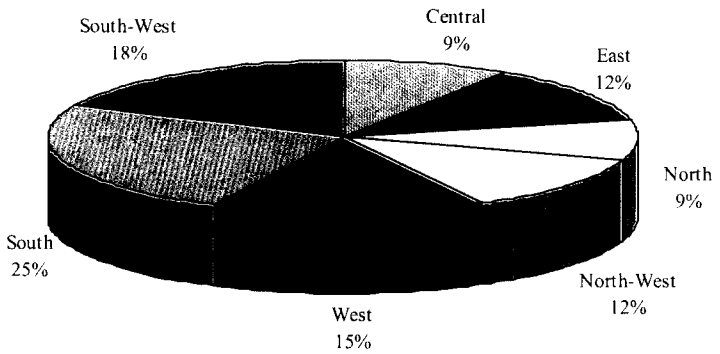
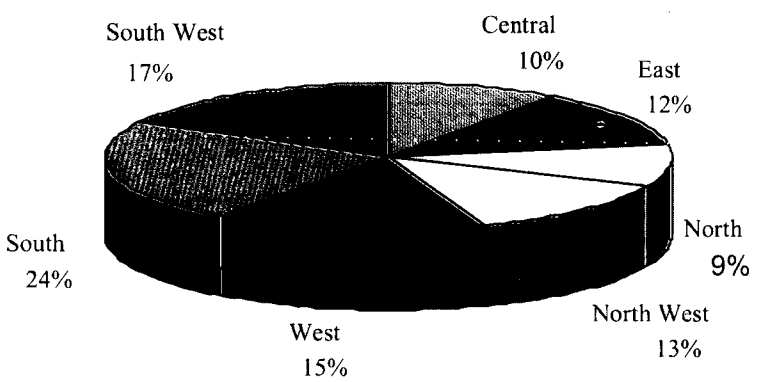


Fig. 6.4 (b) : REGION-WISE GRANTS SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003



Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

Table 6.5 : REGION-WISE GRANTS SANCTIONED UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 - 2003

Region	2000-2001		2001-2002		2002-2003		2000-2003	
	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	Total No. of Projects	Total Amount (Rs. Lakhs)
Central	21	156.87	74	652.06	31	245.43	126	1054.36
East	40	284.87	84	598.73	47	425.39	171	1308.99
North	30	241.28	59	503.7	32	258.68	121	1003.66
North-West	32	238.8	92	740.17	44	381.66	168	1360.63
South	81	598.7	106	822.27	152	996.51	339	2417.48
South-West	33	271.2	119	871.55	103	694.77	255	1837.52
West	36	294.14	106	827.85	69	514.85	211	1636.84
Total	**273**	**2085.86**	**640**	**5016.33**	**478**	**3517.29**	**1391**	**10619.5**

Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

Table 6.6 and Fig.6.5 give the share of grants and projects awarded to University departments, Government, Government-aided and self-financing institutions under MODROBS, R&D and TAPTEC chemes. During 2000-2003 University departments, Government, Government-aided and self-financing nstitutions have respectively received 36%, 26%, 27% and 11% of the total amount disbursed under the three najor schemes. The lower allocation to self-financing private institutions is primarily due to the non-eligibility f such institutions, most of which are of recent origin and have yet to go through accreditation process. Table .7 and Fig.6.6 and 6.7 show the discipline-wise distribution of funds under the above three schemes. Largest hare of the grants have gone to Mechanical, Civil and Electronics & Communication Engineering and Pharmacy. Computer Engineering has received less than 10% of the grants, which is bound to go up in the coming years ue to the need to replace the computers at very frequent intervals to avoid obsolescence. The share of grants isbursed to disciplines like Architecture, Management and even engineering disciplines such as Biotechnology nd Material Sciences is less than 5%. Disciplines such as HMCT and Applied Arts have received very little ttention. With the bulk of the institutions coming up for accreditation in the coming 3-5 years the requirement f funding by the AICTE in support of MODROBS, R&D and the TAPTEC is bound to substantially increase, f it has to make a significant impact on the development of technical education in the country.

Table 6.6 : GRANTS SANCTIONED TO DIFFERENT TYPES OF INSTITUTIONS UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000 -2003

Type of Institution	2002-2003		2001-2002		2000-2001		Total	
	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)	No. of Projects	Amount (Rs. Lakhs)
University Departments	121	1127.35	201	1680.78	141	1103.24	463	3911.37
Government	144	980.77	179	1377.76	48	362.60	371	2721.13
Government-. Aided	134	860.74	198	1511.55	61	460.37	393	2832.66
Self Financing	79	548.43	62	446.24	23	159.65	164	1154.32
Total	**478**	**3517.29**	**640**	**5016.33**	**273**	**2085.86**	**1391**	**10619.48**

ource: (I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)
(ii) AICTE Records

Fig. 6.5 (a) : DISTRIBUTION OF PROJECTS SANCTIONED UNDER MODROBS, R&D ANI TAPTEC SCHEMES DURING 2000 - 2003

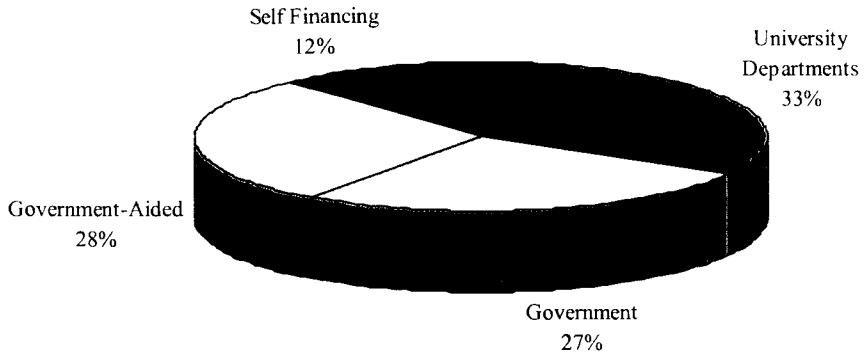


Fig. 6.5 (b) : DISTRIBUTION OF GRANTS SANCTIONED UNDER MODROBS, R&D ANI TAPTEC SCHEMES DURING 2000 - 2003

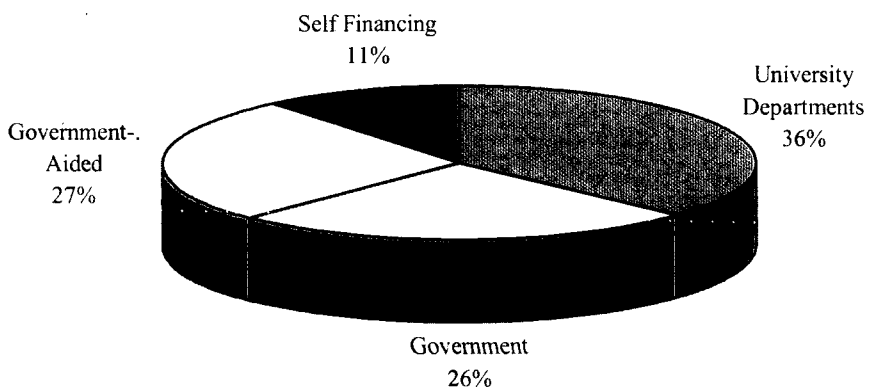
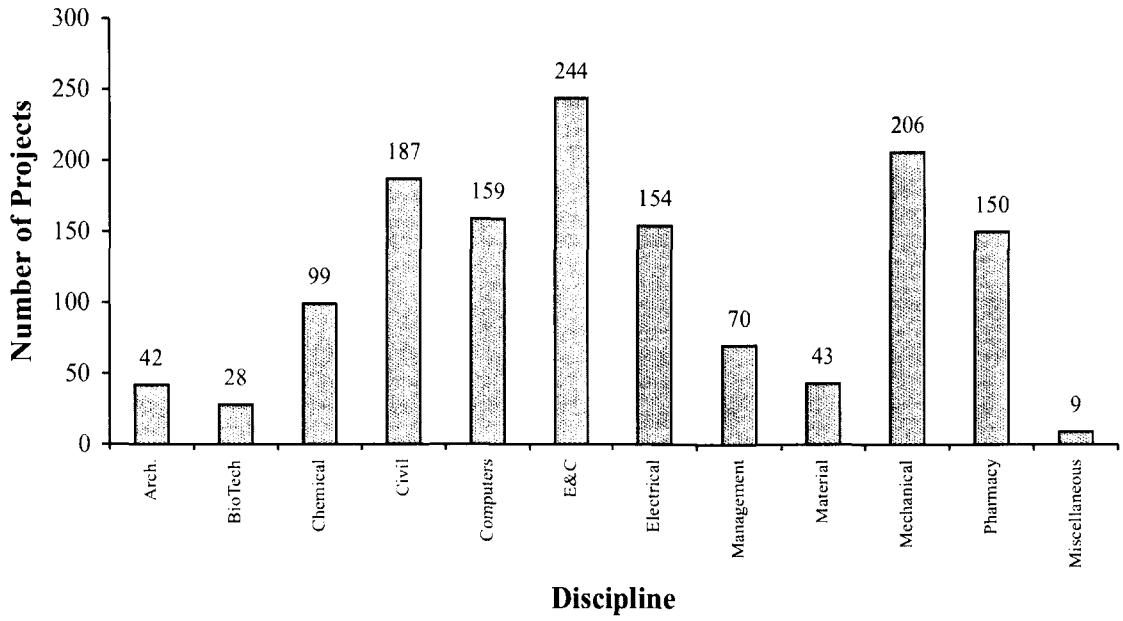


Table 6.7 : DISCIPLINE-WISE PROJECTS SANCTIONED UNDER MODROBS, R&D ANI TAPTEC SCHEMES DURING 2000-2003

Discipline	2002-2003		2001-2002		2000-2001		Total		% of
	No of Projects	Amount (Rs. Lakhs)	No of Projects	Amount (Rs. Lakhs)	No of Projects	Amount (Rs. Lakhs)	No of Projects	Amount (Rs. Lakhs)	Total Grants
Architecture	16	185.26	10	76.20	16	166.90	42	428.36	4.03
Biotechnology	6	51.84	8	89.02	14	82.95	28	223.81	2.11
Chemical	26	265.72	53	493.05	20	148.02	99	906.79	8.54
Civil	73	679.58	94	682.90	20	204.85	187	1567.33	14.76
Computers	37	204.25	78	492.57	44	256.80	159	953.62	8.98
E&C	89	550.48	103	785.50	52	349.85	244	1685.83	15.88
Electrical	73	401.29	72	499.80	9	82.00	154	983.09	9.26
Management	11	81.80	36	270.09	23	130.67	70	482.56	4.54
Material	16	109.35	15	150.40	12	94.13	43	353.88	3.33
Mechanical	77	452.23	94	752.30	35	331.50	206	1536.03	14.47
Pharmacy	45	453.48	77	724.50	28	238.19	150	1416.17	13.34
Miscellaneous	9	82.01	-	-	-	-	9	82.01	0.77
Total	**478**	**3517.29**	**640**	**5016.33**	**273**	**2085.86**	**1391**	**10619.48**	**100%**

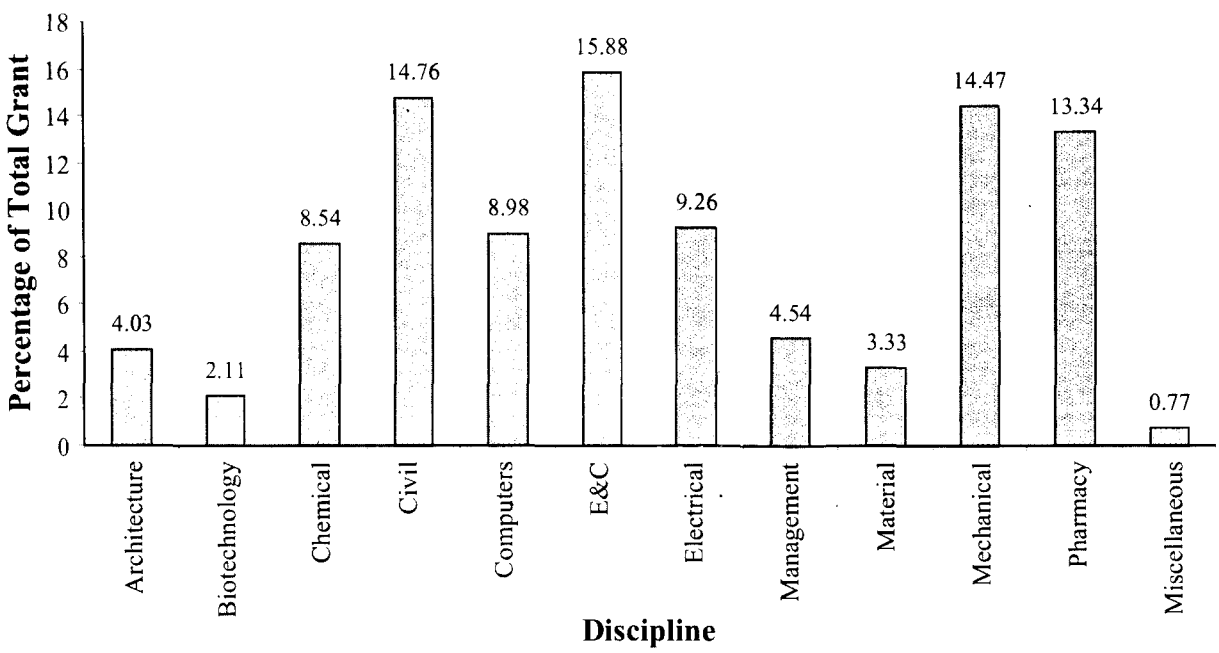
Source: (I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)
(ii) AICTE Records

Fig. 6.6 : DISCIPLINE-WISE SANCTION OF PROJECTS UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000-2003



Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

Fig. 6.7 : DISCIPLINE-WISE DISBURSEMENT OF GRANTS UNDER MODROBS, R&D AND TAPTEC SCHEMES DURING 2000-2003



Source: *(I) Directory of the AICTE Sanctioned Projects 1996-2001 (under MODROBS/R&D/TAPTEC Schemes)*
(ii) AICTE Records

It is important to make a distinction between "modernization" and "removal of obsolescence". While the latter would refer to replacement of obsolete equipment with modern counterparts, modernization could mean adding new facilities in response to the changes in curriculum and technologies. Modern laboratories may have to be added. To this extent the current restriction in the scheme on creation of new laboratories needs to be removed. At the same time, obsolete facilities should be closed down.

Further, it is understood that the scheme permits modernization of only one laboratory at any one time. Modernization of the entire department, which consists of several laboratories, is not within the scope of the scheme. The department may not be able to secure further funding for modernization of other laboratories before the lapse of a considerable period. This could result in a situation where the infrastructure for teaching of a particular discipline would be partly modern and partly obsolete. It is suggested that the proposals for modernization should cover the whole department instead of just one laboratory. In that event the limit of Rs.15 lakhs would be too small and would require enhancing.

The scheme does not provide for constructing accommodation for housing the equipment or for routine facilities such as air-conditioning or vehicles. But there would be times when some sophisticated equipment would pose highly specialized requirements such as special mountings, vibration free-platforms, clean rooms or specially regulated power lines. It is recommended that such requirements can be clubbed with equipment for the purposes of funding under the scheme, if the receiving institution is unable to meet their cost on its own.

It is also important to ensure that the equipment should remain utilizable for as long as possible. To that extent some additional provision can be allowed for maintenance and purchase of accessories / peripheral devices which expand its usage. The key point is that it is important to ensure that the facilities provided under the scheme are put to maximum use and that their effective use is not compromised, by mere technicalities, for want of some small additional funds.

The allocation of funds for the scheme of modernization has been based more on the level of funding in the previous year as a base line, rather than on any real estimation of the total requirement of modernizing the technical education system. Even if a ten years cycle for replacement is assumed, which may well be an underestimate given the fast rate of obsolescence, the yearly requirement would be 10% of the total cost of equipment in the system. The total financial requirements for this purpose should be carefully estimated. The AICTE's budget for the scheme should aim to approach this figure, even if the entire responsibility cannot be

discharged by the AICTE alone. The funding under this scheme needs to be substantially enhanced, at least by a factor of 4 to 5, in order to make a meaningful impact on the quality of technical education.

Consideration should also be given to creation of AICTE funded 'common facilities' at several strategic locations around the country where a number of technical institutions exist nearby. Institutions would be allowed the use of modern facilities on payment of a small user charge, sufficient to meet the direct cost of managing them. The AICTE has to modernize such facilities regularly. In this manner, at a relatively small cost to the AICTE, institutions in the vicinity of these common facilities will have continual access to modern facilities. Indeed, private institutions, which are unable to modernize their equipment regularly, could take advantage of the common facilities on payment of user charges. Any spare facilities should be made available to the industries on payment basis.

6.3 Research and Development Scheme (R&D Scheme)

The primary purpose of the scheme is to build up a research environment in institutions of technical education on the hypothesis that research is a crucial activity for promoting all-round development of the institution and enhancing the quality of academic processes. It stimulates a spirit of enquiry, keeps the faculty up-to-date with developments in their field of expertise, helps in continuous modernization of the curriculum, stimulates modernization of teaching and research laboratories, promotes addition of new laboratories in emerging fields and most of all, conveys to the students – future industry leaders – an important message of research being a problem solving strategy. Research is, thus, a crucial educational strategy and should be promoted across the entire technical education system for this reason alone. The fact that this can also add to the research infrastructure for 'maintaining and accelerating the pace of technological developments in the country' is an added advantage.

The implication of this view of research 'as an educational strategy' is that (i) research must be established, over time, across the entire technical education system and not remain confined to only a few better endowed institutions, subject, of-course to the criterion of critical mass (ii)) funding research in technical education is an internal responsibility of the technical education system and therefore, the AICTE, cannot remain dependent on possible / occasional support from S&T agencies which woulld naturally use their own criteria in choosing institutions and subject areas for funding which are not necessarily educational, and (iii) the criteria for inviting

and evaluating project proposals could well be different from those used in R&D projects aimed solely a technology development. This means a much larger provision in the AICTE budget for funding research ir technical education institutions, which must be based on a realistic evaluation of the needs of the system and no merely on last year's expenditure as a base-line.

Full unfolding of the implications mentioned above is likely to require a total recasting of the objective of the scheme as also the strategy of its implementation. It is suggested that this be undertaken and a revise scheme be developed. When such an exercise is carried out, it would become very evident that the presen level of funding R&D scheme, which is about Rs.6 Crore a year, is very meager, and needs to be enhanced b at least a factor of five to do justice to the scheme.

Further, it is understood that for monitoring of projects, institutional representatives are called to som selected locations and make oral / visual presentations before expert committees. In such a strategy, there i little scope for physical verification of the facilities created and assessing actual progress. This strategy ha been adopted apparently to keep the physical task within manageable limits. The Review Committe recommends an alternate effective monitoring strategy envisaging (i) some of the largest recipients of researc grants such as Anna University or Jadavpur University, should be visited by an expert team at least once ever three years for physical verification and comprehensive review (ii) upto 10% of the other institutions receivin research grants should be chosen randomly for visits and physical monitoring in any one year (iii) all institutior should be required to submit a detailed progress report on a prescribed format every year (iv) in case c demand for an additional grant by the institution, inspection must be made mandatory for ascertaining effectiv utilization of grant released. If, on physical verification at any time it is discovered that the funds have been mi utilized and the reported progress does not bear up to scrutiny, the institution may be required to refund th grants partly or completely. This alternate strategy, which would help to enforce physical verification and o site evaluation of progress, is manageable, even within the limited manpower capacity of the AICTE.

The institutions, which are funded under the MODROBS, R&D and TAPTEC schemes, have point out some of the problems they are facing. Most often their inability to spend the grant, given on a year-to-ye basis, is taken as an indicator of their poor performance. While lack of proper planning by the grant recipient m be one of the reasons, bureaucracy within the institutions, delays in procurement and non-availability of qualifi assistants have also contributed to this lacuna. One way to rectify the problem is to provide block grant fo period of three to five years and avoid yearly grants. In such a case, continuation of the grant must be based

critical peer review of the project. Proactive support and advice by the peer committee to suggest modifications or even mid-course changes in the approach etc., is vital to make the project more meaningful and topical.

Many of the R&D projects are suffering because of the non-availability of assistants. The principal investigator should be given the flexibility to use part of the project grant to give project appointment to young engineers, on need basis, who are willing to work on the project. Project appointments of research assistants (who may even be bright third and fourth year UG's) have the additional advantage of creating potential faculty members.

6.4 Thrust Area Programme in Technical Education (TAPTEC)

The stated objective of the scheme is to promote research in technical education system in identified thrust areas for national development. Representative thrust areas chosen for funding under the scheme include advanced electronics, smart sensors, new construction materials, industrial bio-technology, remote sensing, satellite imaging, optical fibre technology, nano-technology, etc. Project based financial support is provided to the chosen institution upto a limit of Rs.20 lakhs. However, the total amount distributed to various institutions under this Scheme during the last three years is just about Rs.6 crores a year, which is very meagre considering the total number of institutions and disciplines in the country, which need to be supported.

This scheme is sometimes criticized on the ground that the number of thrust areas in the list is too large; only a small number should be chosen so that substantial funds could be provided to enable making a meaningful impact on the R&D in that area. In the opinion of the committee, this criticism is misplaced. The purpose of the scheme should not be viewed as making an R&D breakthrough in a short term, for which, clearly much larger funds and larger research groups would be needed. There are national agencies such as DST, CSIR, DAE, DOS and DRDO for funding such projects. The main purpose of the TAPTEC scheme should be to build up a broader base of capabilities and expertise in a relatively large number of thrust areas, so that when a particular area needs to be given a national push, adequate number of researchers, teachers, M.Tech. and Ph.D students would be available from the technical education system with sufficient specialized knowledge and experience to contribute to the national thrust. In that sense the activities under the TAPTEC underpin and support the R&D thrust in a chosen area by the S&T agencies and their specialized laboratories.

It should also be recognized that it takes considerable time to build up such a human resource base and that it is not easy to predict which area will suddenly become important. Furthermore, no thrust area is an

island, several related areas contribute to it. It is important, therefore, that technical education institutes build up and continue specialized research and teaching programmes in a number of thrust areas. It is more like developing a programme thrust, rather than a narrow, short-term project thrust. The implication of a programme thrust is that the time horizon for funding under the scheme should be longer, minimum of 5 years which could go upto ten if needed. Also, the funding would have to be more selective, instead of spreading it thin over a large number of institutions, funding would be limited to a smaller number of strong and vibrant institutions which can build and maintain a critical minimum level of activity in the chosen thrust area over a reasonable period. A further corollary would be that institutions such as the IITs and NITs should also be included under the coverage of the scheme.

The small number of proposals particularly in R&D and TAPTEC is obviously due to lack of expertise in most of the technical institutions. Expert members of the peer review committee can play a vital role in promoting research, if they proactively support the project by suggesting modifications or even recommending different research topics after assessing the quality of the institution in terms of its available infrastructure and technical expertise.

6.5 Nationally Coordinated Projects (NCP) Scheme

This scheme, originally started by the MHRD, was subsequently transferred to the AICTE. The objective of the scheme is to plan, coordinate and execute integrated R&D programmes at national level by a group of institutions, with clearly defined deliverables. Activities are carried out by a network of institutions and one institution, usually an IIT / IIM or an NIT is chosen as the lead institution. Even though the funding cap of Rs.30 - 40 lakhs for each chosen project is stipulated, the total amount being spent by the AICTE under this heading is just about Rs.15 lakhs a year which has made the programme a non-starter.

In its original design, certain leading institutions with already well established reputation in a chosen area are to be brought together to develop an integrated R&D programme, where overall technological targets are clearly spelt out. A coordination committee consisting of research leaders of the participating institutions should be responsible to allocate developmental tasks among the institutions. The tasks are to be carefully assigned to ensure clear complementarity in the efforts of different institutions, which must be directly linked to the achievement of the overall goal. Institutions should meet regularly under the leadership of the Lead Institution, review progress of each institution in the assigned task and modify the tasks,

ecessary, in the light of interim developments without diluting the thrust on the overall technological goal. A ght coordination is to be achieved by the Coordination Committee to ensure that the participating institutions o not divert their energy to other targets, unless these are agreed to by the coordination committee as being ı line with the overall goal. Resource requirements should be worked out regularly and disbursements to ıdividual institutions by the funding agency should be based on the advice of the Coordination Committee, ubject, of-course, to a broad overall ceiling.

It appears that these original intentions have not been met in the way the scheme is being operated. 'he scheme appears to be a mechanism to fund a loose network of institutions to work in some common areas, ach with its own R&D project. It is suggested that the operation of the scheme be reviewed closely against ıe original design and modified suitably. A strong coordination, not by the funding agency, but by the research ıstitutions themselves, coupled with strong emphasis by the funding agency on the identification and actual elivery of the promised deliverables by the institutions should be the direction for recasting the scheme. A unding level of Rs.30 to 40 lakhs would appear to be reasonable if it signifies the limit for an individual ıstitution but the actual funding should be based on the advice of the Coordination Committee.

5.6 Industry Institute Interaction Schemes

Two schemes fall under this category; Industry Institute Partnership Cell (IIPC) and National Facilities n Engineering and Technology with Industrial Collaboration (NAFETIC). The objective of the IIPC scheme s to establish Industry – Institute liaison across a number of dimensions such as exchange of resource personnel, ›rganizing industrial training programmes and industrial visits, involving industry in the development of appropriate ıurricula, encouraging provision of consultancy services to the industry by the faculty of institutions, undertaking ndustrial R&D, etc. In order to provide an institutional mechanism for maintaining thrust in this direction, the AICTE supports the establishment of an Industry-Institute Partnership Cell (IIP) in the chosen institutions, with one time non-recurring grant of Rs.5 lakhs and a recurring annual grant of Rs.5 lakhs. The AICTE has spent pproximately Rs.2 crores a year under this scheme.

This is an important scheme in as much as effective industry-institute interaction is crucial for ensuring hat (i) academic activities taken up by the technical education system namely teaching, training and research re, and perceived to be, relevant to the current and emerging needs of the industry and (ii) students coming out f the institutions have a meaningful exposure to the industrial world to enable them to acquire suitable skills nd attitudes. Unfortunately, there has been very little interaction between the two, with both sides blaming

each other for not developing a meaningful interaction. Despite the theoretical recognition of the importance of industry-institute interaction, neither side has posed any real demand for interaction. However, with the emerging changes in the operational context of the industries, as they are compelled to compete globally, and require highly competent professionals, and that of the institutions where they will need to generate resources, by serving real needs of industry, as also compete with international education providers, the need for an effective industry-institution interaction is greater than ever before. New patterns of educational programmes such as (i) cooperative education, where industries and institutions design and implement an educational programme together, (ii) competency based teaching, where industries and institutions together identify desired competencies, set competency standards, and test acquisition of competencies, and (iii) innovative Sandwich Models, should be seriously experimented by forging close collaboration between institutions and industry. Similarly, barring a small number, institutions have still to learn to provide consultancy to industry or undertake industrial R&D, which will require industries and institutions to work much more closely.

An IIP Cell is an excellent institutional mechanism, in principle, for carrying out a variety of tasks the institution needs to take up, on a continuing basis, for building up and sustaining industry-institution interaction. Unfortunately, IIP Cells are not viewed as being in the mainstream and do not receive sufficient policy or organizational support from the institution. The AICTE could help to change this situation, by continuing and expanding its support to the IIP Cell and its activities, and if necessary by providing additional manpower and larger operational funds. It is suggested that the AICTE set up a task force to work out a comprehensive strategy for building industry-institution interaction, which aims at operationalising possibilities mentioned above and any others, which are considered desirable. The success of the institution in building a healthy interaction with industry could also be used as one of the parameters for granting accreditation. The task force can suggest a bouquet of schemes, and strategies aimed at promoting different dimensions of industry-institution interaction for consideration and implementation by the AICTE.

6.7 National Facilities in Engineering & Technology with Industrial Collaboration (NAFETIC)

This scheme is aimed at establishment of National facilities in the frontier areas of engineering and technology in collaboration with industry. The National facilities are expected to provide state-of-the-art experimental and theoretical support to researchers pursuing R&D in the specific area of research. The

National facilities established for this purpose are broadly expected to (i) provide sophisticated testing, instrumentation & design facilities to industry in specialized / emerging areas of engineering & technology (ii) provide necessary expertise and know-how for undertaking R&D projects on a turnkey basis in emerging inter-disciplinary areas of relevance to industry and (iii) provide technology incubator facility in the early stages of commercialization of new technologies.

The academic institution proposing to set up a National facility is required to prepare a detailed project report in consultation with the participating partner industries, identifying its own strength regarding expert manpower and infrastructural facilities, and spelling out in detail the tasks and responsibilities of the institution and of the participating industries. Such a facility is to be planned to run on a corporate basis and should be self-supporting through resources generated from user organizations, which use the facility for deriving testing, design, fabrication and R&D services. The participating industries are allowed to avail of various facilities and services available at the National facility on a priority basis and at a concessional rate of payment. The rate of payment could be based on a percentage discount or on profit sharing basis, in proportionate to their own investment, to be mutually agreed upon by the pioneering institute and the participating industry.

In addition to a maximum grant of Rs.50,000/- to the institution for preparing the project report, the AICTE provides a funding upto a maximum of Rs.50 lakhs for setting up the facility itself with a matching grant from the participating industry. Table 6.8(a) gives the details of the total funding made available by the AICTE for the preparation of the project report and for setting up the facilities based on the recommendations of the duly constituted subject expert committee. The total disbursement of funds under this scheme by the AICTE during the last three years is given in Table 6.8(b).

Table 6.8 (a) : INSTITUTIONS RECEIVED A ONE-TIME SEED GRANT OF RS. 50,000/- FOR PREPARING DETAILED PROJECT REPORT IN THE YEAR 2001-2002

Sl. No.	Institution	Chief Coordinator	Project Title
1.	Nirma Institute of Technology, Ahmedabad	Prof. M.B. Jain	National Lab. for testing and development of thermal insulations
2.	Veermata Jijabai Technological Institute, Mumbai	Dr. H.A. Mangalvedekar	National facility for high voltage research & testing
3.	Pondicherry Engineering College, Pondicherry	Dr. P. Dhananjayan	Instrumentation Centre
4.	Coimbatore Institute of Technology, Coimbatore	Dr. A. Sethurathnam	Research Centre for Waste Conservation Technology
5.	University Institute of Chemical Technology, University of Mumbai, Mumbai	Dr. P.R. Vavia	Centre for Novel Drug Delivery System

Table 6.8 (b) : INSTITUTIONS RECEIVED GRANTS FOR SETTING UP NATIONAL FACILITY DURING 2003-2005

Sl. No.	Institution	Sanctioned grant-in-aid for 2003-05	Project Title
1.	Nirma Institute of Technology, Ahmedabad	Rs. 40.00 Lakhs	National Lab. for testing and development of thermal insulations
2.	Veermata Jijabai Technological Institute, Mumbai	Rs. 50.00 Lakhs	National facility for high voltage research & testing
3.	University Institute of Chemical Technology, University of Mumbai, Mumbai	Rs. 36.50 Lakhs	Instrumentation Centre

The Committee views with great concern the poor response to the NAFETIC scheme. A much greater and more proactive effort is needed if the scheme, which has great economic potential, has to succeed. Silicon Valley, Route 128 etc. in the US are excellent examples of industry-institution interaction resulting in great benefit to the academic growth of participating institutions, industrial expansion and socio-economic development of the country. Zhongguancun High Tech Park, often described as China's Silicon Valley supported by Beijing, Qinghua or other nearby universities is another example which hosts over 7000 industrial companies with an annual turnover of over $12 billion, growing at a compounded rate of 20% per year.

In order to make Indian industry globally competitive, it is vital to build strong linkages between technical institutes/research institutions and industries. This will materialize only when industries are mandatorily required to spend a part of their earning on carrying out high quality research. While in many advanced countries, industries contribute to more than 50% of the research being carried out, Indian industries contribute less than 10% to our national research efforts. Poor appreciation of research by even major industries is a legacy of the past industrial strategy, where industries, protected from external competition, got away by selling less than state-of-the art products. Even in the absence of any quality control, poor productivity and low reliability, Indian industries made profit by selling their products at a much higher price than elsewhere, because of the state protection from outside competition.

The Committee recommends that the Government must make it mandatory for all industries, including small-scale industries, to employ qualified diploma holders or engineers for all technical jobs in order to become competitive in the global market. The existing or presently employed personnel who do not have technical qualifications must be sent for training by the industries to enable them to acquire knowledge of the latest trends and practices, of quality control and production techniques. Industries must also be incentivised to forge strong links with our technical institutions and support research in these institutions. In the prevailing atmosphere of globalization, industries must be made to realize that the past strategy of dependence on advanced countries will lead them nowhere and it is in their own self-interest that they must promote indigenous research efforts for improving their products and performance and enabling them to effectively compete in the global market. The Committee strongly recommends that each industry be mandated to spend at least 10% of its gross profit towards carrying out their in-house research and supporting research activities in other technical institutions.

The Committee recommends that under NAFETIC scheme, the AICTE should establish a few Technology Business Incubators (TBI) in specific thrust areas of technology around major institutions in the country, to enable young entrepreneurs to start new ventures. Over 4,000 TBI's are in existence today across the world, which are

growing at an annual compounded rate of 10% to help Small and Medium Sized Enterprises (SME) to start their own ventures. While USA has around 800 TBI's, Germany 700 and China 150, India does not have even a single worthwhile TBI, satisfying the above criteria. Experience in US and elsewhere indicates that TBI's become self-sustainable in three to five years and the success rate of entrepreneurs joining the TBI's and then moving out to form a separate independent industry of their own within a period of 5 years after the start, is over 80%. A detailed study has shown that TBI's have contributed to 40% of additional employment and over 30% income benefits to local areas and communities where such incubators have been set-up.

The Committee recommends that the AICTE, in partnership with industries, set-up at least 10 TBIs with a seed funding of Rs.50 crores spread over 3 years around important technical/industrial centres to assist, enable and facilitate young engineering entrepreneurs to start their own auxiliary industries, which can also feed the larger industries located around such TBI parks by becoming their major outsourcing units. The participating industries, which are also the beneficiaries of this scheme, must be persuaded to contribute an equal amount for the setting up of such TBI parks.

6.8 Entrepreneurship and Management Development Scheme (EMD)

The objective of the scheme is 'to encourage students to consider self-employment as a career option, provide training in entrepreneurship and increase the relevance of management in the non-corporate and unorganized sector. A non-recurring grant of Rs.4 lakhs and an annual recurring grant of Rs.4 lakhs is provided as a project grant for the above scheme. During the last three years, the AICTE has spent about Rs.60 lakhs a year on this scheme.

The scheme appears to be a convenient omnibus 'dump bag' where a number of important objectives have been simply dumped together. Clubbing the whole of Management Development with a small scheme for entrepreneurship clearly does not do justice to the scope of management development. A series of separate initiatives and schemes would be needed to deal with management development. Furthermore, management of the non-corporate and unorganized sector is such a huge task, calling for a major redesign of the whole of management education and training that an almost incidental reference in a small scheme can hardly suffice. It is suggested that the scheme should be redesigned and focus on entrepreneurship development. Other elements of the current scheme should be taken up separately and developed into a number of new schemes, which do justice to the range, and complexities of the issues involved.

Even in the area of entrepreneurship a great deal more needs to be done. The aim of sensitizing and encouraging students to consider self-employment as an option cannot be achieved by some short-term training or a short ad-hoc educational module. Entrepreneurship education should be seen and implemented as an integral part of the development of every student. Every student should be given entrepreneurship education / training during the 3rd and 4th year of their undergraduate training. In the project work that students undertake as part of their degree programme, some could be assigned projects related to entrepreneurship. Years back, under a scheme supported by the Department of Science and Technology, Entrepreneurship Cells were established at a number of institutions of technical education. Separate faculty, initial funds as also recurring funds were provided to the Cells to promote entrepreneurship. Research and training in entrepreneurship, collection and dissemination of information in support of entrepreneurship development, help in the establishment of entrepreneurship parks, etc., were some of the objectives. It would be worth examining how these Cells have functioned over the years, what difficulties they faced, what factors have impeded the uptake of entrepreneurship and, what restructuring and support should be provided to them. The possibility of linking the AICTE and DST initiatives should also be examined. Armed with this analysis the AICTE should redesign and develop its initiative in entrepreneurship development.

Entrepreneurship development is not a matter of providing education, training and a basket of support alone, it requires a cultural change. Institutions, which succeed in promoting entrepreneurship among its students, are often those, which succeed in bringing about a mind-set change and provide opportunities to the students and faculty to undertake entrepreneurship projects. The example of BIT, Ranchi, which set up an entrepreneurship park and supported its former students who took up entrepreneurial ventures in the park, is a case in point. Another is the initiative of Indian Institute of Science, Bangalore, which has permitted its faculty to set up their own enterprises along with promoting a policy framework in support of entrepreneurship, linking institutional efforts with such initiatives as STEP and Technology Incubation Centers should be given serious consideration. The AICTE can play an important role in this.

6.9 Early Faculty Induction Programme (EFIP)

The quality of technical education largely depends on the quality of teachers. Adequately qualified, highly competent and motivated faculty is becoming scarce in technical institutions all over the country. The shortage of faculty has become more acute due to rapid growth of technical institutions in the country. High

priority has therefore to be given by the AICTE to attract bright young and motivated students studying in various technical institutions to the teaching profession.

The AICTE administers the "Early Faculty Induction Programme (EFIP)", with a view to attract bright young undergraduate students in Engineering & Technology / Pharmacy / Architecture etc., to take up teaching as their career by selecting them early when they are still in the final year of their undergraduate B.E. / B. Tech/ B. Pharmacy / B. Architecture course. Such bright students, selected at the National level, are given opportunity to pursue higher education (Postgraduate & Doctoral Programmes) in one of the leading technical institutions in India. After completion of their postgraduation, their placement is ensured as teachers in the AICTE approved technical institution, thus providing them avenues to serve as teachers in institutions of their choice.

Teaching Fellows pursuing PG programmes receive a fellowship of Rs.10,000/- per month, in addition to the academic expenses such as tuition fee, laboratory fee etc., which is paid directly to the host institution. All GATE qualified students in the first semester of M.Tech. or equivalent programme and B.Tech graduates with grade point average of 8 and above in the slot of 10 from IIT's pursuing M.Tech. programme in recognized EFIP Centres or students in the final year of an appropriate branch of Bachelors Programme of a technical institution with a consistently excellent academic record (not less than 65%) are eligible to apply under this scheme, provided the final year results are declared by the time registration for PG programme commences at Host Institutions.

The AICTE has recently revised these guidelines to make it even more attractive than before. As per the revised guidelines for the EFIP scheme.

- Candidates will be selected from the students who are in the first semester of their PG programmes and are already pursuing M.E/ M. Tech./ M. Arch./ M. Pharm programmes in the AICTE approved technical institutions.
- Starting from the year 2003-04, the advertisement for the EFIP scheme will be widely published in news papers and official web sites around July/August every year, inviting applications from the existing first year M.E./ M. Tech. / M. Arch/ M. Pharm candidates.
- Each EFIP candidate after selection would be eligible for getting a contingency grant of Rs. 10,000/- per year of the PG programme, towards purchase of books and / or equipments or for attending seminars/ workshops/ conference within the country during their PG programme.

Within the duration of the PG programme, the respective EFIP Coordinators would arrange a two-week course for the EFIP candidates within their region, in the area of pedagogy and teaching skill development.

The EFIP candidates may be required to help the department where they are undergoing PG programme in teaching related activities, as per institute norms.

During the 3rd/4th semester of the PG programme of the EFIP candidates, the Chief EFIP Coordinator would prepare a placement brochure giving brief background and bio-data of each graduating EFIP candidate, which will be circulated to all the prospective employers such as Universities, Technical Institutions etc.

- Technical institutions including NITs will be requested by the EFIP Coordinators to send their advertisements for employment, to the EFIP centres for publicity to the EFIP candidates.

- During the 3rd / last semester of the PG programme of the EFIP candidates, each of the proposed EFIP Coordinators would arrange an 'employment meet' between the EFIP candidates and various technical institutions, University departments etc. The objective of the above 'employment meet' is to facilitate the EFIP candidates in getting proper placement in an institution where the EFIP candidate can join as a lecturer in the AICTE grade.

- A notional bond will be executed between the EFIP candidate and the hiring technical institution to teach for a period of three years.

- Once an EFIP candidate joins the technical institution as a Lecturer in the AICTE Lecturer's grade (pay scale with all emoluments as per the AICTE norms), the candidate would be paid an amount of Rs. 5,000/- p.m. by the AICTE for a period of 3 years which would be in addition to their salary as a lecturer in the AICTE Lecturers grade.

- Any EFIP candidate, who does not get selected by any technical institution inspite of the above mentioned efforts, would be paid a consolidated amount of Rs. 10,000/- p.m. by the AICTE for a maximum period of 6 months, while the candidate continues to remain in the Institute where the candidate acquired the PG degree, helping the Institutions/ department in teaching activities.

- If the EFIP candidate does not get a proper teaching position in any technical institution within this period of 6 months, then the candidate would be freed from the EFIP bond obligations regarding three year teaching.

So far under this scheme, the AICTE could select only 28, 90, 38 and 6 EFIP scholars from the 1999, 2000, 2001 and 2002 batches respectively. The revised EFIP scheme will probably reverse this trend and attract many meritorious students to join the scheme.

6.10 Quality Improvement Programme (QIP)

The Government of India launched the Quality Improvement Programme (QIP) in the year 1970 with the objective to upgrade the expertise and capabilities of the faculty members of the degree level institutions in the country. The programme is now being implemented and monitored by the AICTE. Under the QIP programme, faculty members working in the AICTE recognized institutions, have the opportunity of improving their qualifications by joining a Master's or Doctoral Degree programme. Full-time regular/permanent faculty members of the AICTE in the approved degree level colleges are eligible to apply for the scheme, with the stipulation of a minimum criteria of one year teaching experience at graduate level for the Master's Degree, and three years experience for the Doctoral degree. Selected candidates are treated as on deputation, their normal salary and allowances being paid by the parent institution on execution of a bond to serve their parent institution for a minimum period of two (Master's Degree) or three years (Doctoral Degree) after the completion of the programme. In addition, the selected candidates are paid scholarship and contingency grants as follows :

- For Master's Degree Programme:

Scholarship (per month)	:	Rs.2,500/-
Contingency grant (per annum)	:	Rs.3,000/-

- For Ph. D. Degree Programme:

Scholarship for first two years (per month)	:	Rs.6,000/-
Scholarship for third year (per month)	:	Rs.6,400/-
Contingency grant for three years (per annum)	:	Rs.10,000/-

A large number of faculty members from the AICTE recognized degree level institutions from all over the country have pursued Master's and Ph.D. degree programmes under this scheme (Table 6.9).

Table 6.9 : FACULTY ENROLLED FOR PURSUING POSTGRADUATE AND DOCTORAL DEGREES UNDER THE QIP SCHEME

Year	Postgraduate	Doctoral
1997-1998	93	73
1998-1999	100	149
1999-2000	108	129
2000-2001	139	173
2001-2002	183	211
2002-2003	189	168

Supplementing the primary QIP programme, short-term courses in advanced topics are organized by ıe AICTE for updating the knowledge of teachers. The AICTE has also created a Curriculum Development :ell to continuously update the curriculum / syllabus, and organize workshops / seminars for achieving excellence ı technical teaching. Even though the scheme was initially restricted to the teachers of only engineering olleges, the AICTE has now decided to extend the QIP scheme for teachers in Pharmacy, Applied Arts & :rafts, Master's of Computer Applications, Town and Country Planning, Architecture and Hotel Management nd Catering Technology.

Further, the AICTE has also extended the QIP Scheme to polytechnic teachers for pursuing ME/M.Tech ›rogrammes in various disciplines under the scheme QIP(Poly). The objective of the scheme is to strengthen the :apability and competence of the faculty in polytechnics. Sponsored full-time teachers from the AICTE approved ›olytechnics are also eligible for admission to Masters Degree programme which allows them to acquire further echnical training and better their academic advancement. The eligibility criteria for selection of candidates under his scheme are a minimum of Bachelors Degree or equivalent in the appropriate discipline and three years eaching experience. The candidate selected for admission under QIP (Poly) will have to execute an undertaking ɔ serve his/her parent institution for a minimum period of three years after completion of the programme. The \ICTE has made adequate provision to recruit a maximum of 50 candidates each year, under the QIP (Poly) cheme, even though it could select only 31 candidates during 2001-2002 and 33 during 2002-2003.

.11 Schemes for Management, Pharmacy and Architecture Education

There are no schemes specifically for promoting management, pharmacy or architecture education. It as been argued that the existing schemes are open to all areas and hence to these areas as well. A comparison f the number of management proposals sanctioned during 2002-2003 with those in engineering would show a ery large disparity in access, only 11 projects were sanctioned in management as against 417 for engineering in ›ite of the fact that the total number of management institutions which is around 930, is almost comparable to that

of engineering. Management has received only 4.5% of the total funds disbursed by the AICTE for technical education. Further, the data shows that management education is treated as if it were one discipline like chemical or civil engineering. This hides the fact that management, like engineering, is composed of a number of separate disciplines and should not be compared with any one discipline of engineering but with engineering education as a whole. A similar picture applies to Pharmacy and Architecture but perhaps with less severity.

It is important that a greater balance is achieved among different areas of technical education. If a sufficient number of proposals is not received from these non-engineering areas, the AICTE should examine the reasons for the same and evolve a proactive strategy for increasing access of these areas to the AICTE's developmental schemes. There may well be a need to develop separate schemes for these areas, more in line with their particular contexts and needs.

6.12 Miscellaneous Schemes

6.12.1 Scheme of Travel Grant

This scheme provides financial assistance to faculty members of various institutions to participate in conferences, seminars and symposia within the country and abroad. The support is limited to fifty percent of the total expenses and can be availed by an individual only once every five years. In exceptional cases, for young candidates upto the age of 35 years, the Council may provide assistance even upto 100%. Expert committees examine proposals received once in every three months.

This is a most useful scheme. However, some minor modifications would increase its impact greatly. First of all the budgetary allocation should be enhanced so that more persons can benefit from it. Second, the limit of 50% means that candidates have to search around other sources for the remainder. In many cases they do not succeed and thus fail to benefit from the AICTE grant. It is suggested that the AICTE may provide full assistance to those found deserving, particularly for attending conferences, seminars and symposia. In any case, there should be no age restriction for necessary travel grants, even though preference could be given to those under the age of 45 and those who come from relatively less-endowed institutions. Faculty from better-known institutions not only have their own institutional schemes to fund foreign travel but they also have easier access to travel funding from other sources.

The Committee recommends that the AICTE should give wide publicity to this scheme. Such publicity will make all the staff members in various technical institutions aware of what is going on and indirectly encourage them to emulate successful examples.

6.12.2 Scheme of Seminar Grant

Assistance to institutions for organizing conferences / seminars / symposia at national and international levels is most helpful for increasing faculty exposure to new developments and emerging areas. Given the general shortage of funds for the purpose and the need for expanding this activity across the technical education system, it is suggested that the funding for the scheme be enlarged. The AICTE could aim at supporting around 100 such events annually.

6.12.3 Scheme of Emeritus Fellowship

The scheme is aimed at utilizing the services of highly qualified superannuated Professors for stimulating excellence in the AICTE approved institutions. This is an excellent initiative. Technical education system is short of faculty in any case. Availability of high quality superannuated persons for stimulating development of a new field, strengthening teaching, research and other academic activities would certainly help in improving the quality of the system. Two suggestions are made: (i) the number of fellowships should be increased, (ii) the amount of fellowship should be enhanced to Rs.25,000/- a month which needs to be adjusted with each pay scale revision. Emeritus Professors should be provided housing, transport and other amenities as available to the regular staff.

6.12.4 Scheme of Visiting Professorship / Adjunct Professorship

The objective of the scheme is to supplement / provide expertise in emerging areas of technical education where the host institution may need help in teaching or research activity. This is a useful scheme. Increasing the number of fellowships can enlarge its impact. Consideration should also be given to increasing the honorarium, providing appropriate accommodation and transport facilities and covering the cost of TA/DA.

6.12.5 Scheme for Support to Professional Bodies / Societies

Several professional bodies operate programmes of technical education and training to provide opportunities for continuing education / training to their members for their professional growth. Their effort complements the effort of the AICTE and institutions of technical education engaged in providing initial education. The scheme of support to professional societies is therefore most welcome. It is suggested, however, that the AICTE may develop an explicit, well articulated policy laying down criteria for (i) identification of the nature of activities to be supported, (ii) choice of professional societies and (iii) quantum of support. A committee may be set up for the purpose.

CHAPTER 7

COORDINATION WITH OTHER AGENCIES

7.1 Preamble

Section 10(b) enjoins upon the AICTE to "coordinate the development of technical education at all levels". Section 10(f) specifically refers to such a need by stating that the Council may "promote an effective link between technical education system and other relevant systems including research and development organizations, industry and the community."

For attaining the objectives of planning and coordinated development of technical education system and related tasks of promotion of qualitative and quantitative growth and regulation and maintenance of standards, the AICTE has to coordinate with a number of agencies. Among them, one of the foremost is the UGC. The UGC is primarily responsible for the development of Universities but the AICTE also has a role in this task as far as technical education component of the Universities is concerned. For promoting research in thrust areas and for encouraging faculty members to take up research work, coordination with institutions/agencies like IITs, CSIR, DAE, DOS, DRDO and DST is necessary. Likewise, for the promotion of industry partnership, interaction with industry is required to be developed. There are, in fact, a number of sub-systems or agencies, as also the State and Central government, with whom the AICTE will need to interact and work together. The perceived needs for such coordination are outlined in this Chapter.

7.2 University Grants Commission

7.2.1 Coordination in the matter of Deemed Universities

The UGC Act provides in Section 3 for the declaration of an institution of higher education as a Deemed University. As per the AICTE Act, the Council may, under Section 10(t), "advise the Commission for declaring any institution imparting technical education as a Deemed University." The AICTE has laid down a detailed procedure for the grant of Deemed University status for technical institutions. However, as pointed out in Chapter 4, once a technical institution gets the status of a Deemed University, the AICTE ceases to have

any real role in it. This could negate the role of the AICTE in maintaining standards, as there would be no independent and further check on the institutions which have attained deemed or autonomous status. Furthermore, the Committee has not come across any evidence that would suggest that such institutions have adopted a transparent and rigorous system of auditing the quality of education and research. It is important that the Deemed University status is granted only to those institutions which can maintain quality consistently over time and which get their status revalidated by the AICTE periodically.

Clearly, the role and involvement of the AICTE in a Deemed University cannot be the same as in an ordinary technical institution. The purpose of granting the Deemed University status to an institution would be to recognize, formally, that the institute has reached a certain stage of development, and has shown a level of maturity and responsibility, that it can be trusted with developing and maintaining high standards. Further, that it can be granted a degree of autonomy so that the institution will have the freedom to design innovative courses, adopt new pedagogical approaches and generally experiment with creative ideas, which would help open up new approaches and possibilities in technical education. Autonomy is thus at the core of the concept of a Deemed University. The AICTE's role should not be such as would jeopardize or limit the autonomy of the institution. That would be counterproductive. At the same time, it is possible that some institutions on obtaining the status of Deemed University may misuse this autonomy and work in a manner not consistent with the trust reposed in them. Since the AICTE has the statutory responsibility for maintenance of norms and standards in technical education, it should have some appropriate role even in a Deemed University which is consistent with its statutory responsibility on the one hand, and with the need to protect the autonomy of the institution on the other. A way for dealing with this would be to set up a joint committee of the UGC and the AICTE, which would periodically monitor the functioning of the Deemed University, and recommend whether or not to continue the special status.

On this and other aspects of coordination between the AICTE and the UGC in the matter of Deemed University the following recommendations are made:

- The procedure of granting Deemed University status should be made tighter. Only those institutions, which consistently get 'A' grade in accreditation of all their programmes, should be eligible. Further, their status as Deemed Universities would be subjected to re-examination and re-validation once every five years.

- Grant of Deemed University status to well established institutions, whether independent or affiliated to a university, which have established credibility in maintaining high standards and shown the capability of undertaking responsible and innovative practices, is a welcome trend that should be expanded and enlarged. The attendant autonomy and experimentation would be good for improving the quality of technical education and pushing its frontiers. However, care has to be taken that this does not provide a back-door entry to mediocre institutions. For preventing this, some further recommendations are made below.

  - For the purpose of declaration of a technical institution as Deemed to be a University, it should first have been set up with the approval of the AICTE and running courses duly approved by the AICTE at least for ten years.

  - In the case of technical courses, both at UG and PG level, all the programmes should have been accredited by the NBA.

  - At campuses in places other than the headquarters of the Deemed University, the proposal for starting various academic professional courses should have the prior approval of the AICTE.

  - The overall performance of the Deemed University and its campuses located at places other than headquarters shall be monitored every 5 years, jointly by the UGC and the AICTE. The UGC will take the recommendation of the monitoring committee in deciding whether or not to continue the Deemed University status.

  - For preliminary scrutiny of proposals for Deemed University status, the UGC shall constitute an expert committee in which the AICTE representative will be invited.

  - UGC will send an expert committee to selected institutions for inspection. It shall be a joint committee of the UGC and the AICTE.

  - After the report of the inspection committee has been shared with the AICTE, the UGC will obtain the formal recommendations of the AICTE on the proposal to grant Deemed University status.

  - The UGC will stipulate that the Board of Management of the Deemed University shall have a nominee of the AICTE.

- An Advisory Committee should be set up to help academic planning and growth of the Deemed University. This committee will have at least one representative nominated by the AICTE.

7.2.2 Coordination in the Development of Universities and Affiliated Institutions Imparting Technical Education

Section 10(c) provides for "allocation and disbursement out of the Fund of the Council such grants, on such terms and conditions as it may think fit, to universities imparting technical education in coordination with the UGC". The AICTE operates a number of schemes for promotion of technical education aimed at modernization and removal of obsolescence of educational facilities, development of new thrust areas in technology, promotion of research, faculty development, industry-institution interaction, supporting organization of conferences and seminars, supporting faculty for participation in international seminars, and so on. In view of the AICTE's responsibility for the coordinated development of the technical education system as a whole, the development of technical education under the university system is also the responsibility of the AICTE, albeit in coordination with the UGC. However, the AICTE's funds are limited and it has also to look after institutions of technical education, which are the responsibility of the UGC. Considering this picture the following recommendations are made:

- The AICTE should continue to provide funding to Universities and university affiliated institutions of technical education under its various schemes for promotion of technical education and also endeavour to enlarge its support to them within the limits of its resources. For meaningfully dealing with this expectation as also discharging other obligations specified under Section 10(c), the AICTE's funding should be suitably enhanced.

- At the same time, the UGC should provide adequate financial support to institutions of technical education under the university system. There is an impression that institutions under the university system tend to fall between two stools and do not receive as much priority in funding by the UGC that they require, perhaps on the assumption that their needs will be taken care, by the AICTE. This impression needs to be dispelled. Section 11 of the AICTE Act provides for inspection of universities by the AICTE for ascertaining their financial needs and, standards of teaching, examination and research. Accordingly, the AICTE should conduct periodic surveys

of the financial needs of the technical education system under the universities. In such inspections the concerned university as also a representative of the UGC may be involved. Thereafter, the UGC and the AICTE should jointly examine the development needs of the technical education system under the universities and agree on their respective responsibilities and the degree of support each would provide annually.

7.2.3 Coordination in respect of Accreditation

Two systems of accreditation exist – one is the National Board of Accreditation (NBA) under the AICTE, and the other is the National Accreditation and Assessment Council (NAAC) supported by the UGC. The NBA is a statutory body and the accreditation by it is mandatory, whereas the NAAC is non-statutory and its accreditation is voluntary. Despite the similarity of objectives there are significant differences in the approach, procedures and criteria between the two accreditation systems. As far as the technical education system under the universities is concerned, some confusion exists on which accreditation body, the NBA or the NAAC, should accredit it. Section 10 (u) of the AICTE Act would suggest that it is for the NBA to accredit such institutions and their programmes. Whereas in the case of the technical institutions, not being universities, the NBA would make its recommendations for suitable action to the AICTE, in case of university institutions, the stipulation in the Act is that the recommendations would go to the UGC.

- It is recommended that the Accreditation of any institution of technical education, whether under the UGC or outside it, should be the responsibility of the NBA and that the accreditation would be mandatory and based on the criteria and procedures of the NBA. This would ensure that there is a common standard and procedure for accreditation of technical education.

7.2.4 Coordination Forum

The AICTE Act provides for the participation of the Chairman of the UGC both in the Council and the Executive Committee. This was intended to provide an opportunity for active coordination between the AICTE and the UGC. Unfortunately, the participation of the UGC Chairman, with some exceptions, has been infrequent. Further, there is no provision in the UGC bodies for the participation of the Chairman, AICTE. This has resulted in less than adequate interaction between the AICTE and the UGC at the highest level. Nor do any other formal arrangements exist for regular interaction between the two statutory bodies whether for overall strategic coordination of vision and efforts or in respect of specific development issues.

- It is recommended that (i) Chairman AICTE should be represented in relevant UGC bodies just as the Chairman UGC is represented in the AICTE bodies (ii) a UGC-AICTE Forum is set up to facilitate regular coordination. Such a forum should meet at least twice a year and deliberate on all major issues ranging from developing a coordinated vision on technical education to sorting out approaches and procedures for dealing with specific issues of common concern. An important area where coordination is crucial is that of pay scales, service conditions and career advancement for teachers where some significant differences still exist between the UGC and the AICTE. This creates anomalous situations for teachers of technical education in institutions affiliated to a general university.

7.3 State Governments

The issue of coordination with the State Governments has to be seen at one level in the light of Entry 66 in the Union list in the Constitution, which enjoins the Union government to perform the tasks of "coordination and maintenance of standards of higher and technical education and research". The UGC and the AICTE were set up by the Union government in response to this responsibility. As far as technical education is concerned, this provision would seem to give primacy to the AICTE in matters relating to technical education. It needs to be recognized, however, that this does not grant an exclusive role to the AICTE; nor can the State Governments' role be negated. The State Governments are responsible for the overall development of the State and would have a legitimate expectation that the creation of technical institutions and the supply of technical manpower from them would take into account and reflect the priorities of the State's developmental plans.

Furthermore, the administrative issues which arise in relation to the establishment of the institution, or issues and problems which arise in the course of operation of the institution, or even issues which may arise in the eventuality that the institution has to be closed down for some reason – such as law and order, rehabilitation of affected students to some other institution, etc – are also in the domain of the State's responsibility. The AICTE has to depend, at times, on the cooperation of the State machinery for implementation of its decision. The State Government is not only closer to the field and therefore better able to monitor any particular situation, it also has the first responsibility for what happens in that State. It also has to ensure that the development of technical education in the State is consistent with its larger policy framework. For all these reasons and many more, the State has to be closely involved in the planning and development of technical education in the State.

7.3.1 Approval Process

Section 10(k) provides for grant of approvals in consultation with the agencies concerned. In this context three agencies are involved in the approval process, namely, the AICTE, the concerned University and the State Government. The final decision is taken by the AICTE. The process involves a No-Objection Certificate by the State Government and agreement by the University to affiliate the institution in case of degree level institutions. There have been occasional disputes about the meaning of the term 'consultation' and whether the AICTE can go ahead if the other parties have not indicated their agreement or delayed it unduly. There have been differences about the precise modalities and whether inspections by the agencies should be separate or joint. Further, questions have been raised whether the entire process should remain centralized in the AICTE or can it be decentralized to the State for some levels of education, and for certain subsequent decisions, such as changes in intake-level or starting of new courses. After consideration of the merits of various options the following is recommended:

- An NOC from the State Government should be necessary for the AICTE to consider a case for approval. In a similar vein, prior agreement of the University for affiliation would be needed before the AICTE considers the case.

- Separate inspections by the State for the purpose of the NOC and by the University to examine the prospects of affiliation, followed by a Visiting Committee of the AICTE, make for multiple inspections and cause undue hardship to the applicant institution and delay. It is suggested that the State Government and the University should jointly decide on the NOC and affiliation. Once their agreement is communicated, the AICTE will send its visiting team for deciding on new approval or increasing intake. Annual visits by the AICTE Committees for the purpose of renewal of approval shall be replaced by visits ordinarily once in every five years. In the interim, the institutions will supply information to the AICTE on the progress made which will be publicized on the website and will also be communicated to the State Government for information and comments, if any.

7.3.2 Coordination in respect of Polytechnic Education

At the lower end of the spectrum of programmes, the AICTE has diploma courses run by polytechnic Till recently, the AICTE was discharging its responsibilities towards such diploma programmes in the san

ıanner as for degree programmes. Recently, the AICTE has decentralized the approval process for diploma rogrammes to the state level.

While the approval process may have been decentralized, the AICTE still has a role on various issues, vhich include:

- Norms and standards for programmes and institutions.
- Model structure of programmes and syllabus.
- Salaries and service conditions of teachers.
- Faculty development and QIP scheme.
- Linkages with TTTIs.

The AICTE has an All India Board of Technician Education. The expertise of the Board can be ıtilized to develop coordination mechanisms with polytechnic education.

7.3.3 Coordination in respect of Development of Technical Education

Some States have lagged behind others in developing an adequate system of technical education, ılanning the development of new institutions, improving the quality of institutional infrastructure and facilities, ınd taking advantage of the developmental schemes run by the AICTE. It is important that the AICTE should ıncentivise to stimulate these States into building an appropriate technical education system.

Some states have allowed certain developments and practices to come up which are counterproductive o the quality and sustainability of the system and might also be considered commercial and exploitative.

There is an urgent need for developing a common understanding on key issues and the developmental ıgenda for technical education system as a whole, as also key issues particular to a State, so that the State Government and the AICTE can pursue the agreed directions across the entire system. The AICTE can play ı facilitating role in the endeavours of the State governments.

For developing a common understanding and agreeing on the actions, it is recommended that individual States and the AICTE should hold regular consultations. These meetings are intended not for consultations on

ad-hoc specific issues but for discussions across the board for developing a broader understanding of what needs to be done and how. The current practice of consulting the States as per need or as part of the AICTE committees does not serve this larger purpose.

7.4 Professional Bodies

There are two types of discipline-based professional societies being considered here. They are (i) Statutory and (ii) Non-statutory. Issues connected with them are different and, hence, they are being dealt separately.

7.4.1 Statutory Councils

Statutory Councils with which the AICTE has commonality of interests are the Pharmacy Council o India and the Council of Architecture. These Societies have, as per their Acts, jurisdiction on education as wel as profession. Their jurisdiction on education has an overlap with the AICTE Act and, hence, the creation o conflicting situations at times.

One possible interpretation of the relevant Acts taken together could be that the provisions of the late Act supersede the earlier Act. Notwithstanding this possibility it was decided that the AICTE and the relevan Councils should work together. This view was translated into action. Accordingly, Chairman/President of th Society was made Chairman of the Board of Studies of the concerned discipline in the AICTE. Notwithstandin such arrangements, and the specific provision in the AICTE Act that Pharmacy, Architecture and Town Planning education are the responsibility of the AICTE, the concerned Societies (the discipline-based Councils) continu to be over-assertive when it comes to educational issues such as approvals.

In order to make the functioning free from conflicts, it is proposed that the discipline-based Societie having statutory status should shed their primary responsibilities in the sphere of education and that they shoul focus only on issues relating to practice of the profession such as, registration, continuing professional developmer and code of conduct. The AICTE should, in such a division of functions, involve the statutory bodies i education but statutory powers in education-related matters should be only with the AICTE. In the same vei the responsibility of registration of professionals should be only with the professional societies.

7.4.2 Non-statutory Societies

The AICTE's interest in non-statutory societies is confined to those bodies, which are engaged in tasks relating to education, such as conducting examinations and awarding qualifications. Such Societies are playing the important role of disseminating knowledge, developing the profession and providing opportunities to individuals for upward mobility. In addition, Societies are contributing to the supply of trained manpower. There is, thus, a complementarity of roles of the AICTE and the Societies. Involvement of the AICTE in the tasks of such Societies would enjoin the AICTE to play a certain role as indicated below.

- The examinations of some of the Societies were given recognition by the Government of India once upon a time. The arrangement of recognition should be systematized by laying down norms and procedures and provision for renewal. Section 10(l) of the AICTE Act empowers the Council to "advise the Central Government in respect of grant of charter to any professional body or institution in the field of technical education conferring powers, rights and privileges on it for the promotion of such profession in its field including conduct of examinations and awarding of membership certificates".
- Norms and standards and other criteria applicable to educational programmes in the formal sector cannot be applied ipso-facto to those of the professional Societies. The AICTE should evolve, jointly with the professional Societies, norms, criteria and other modalities for granting recognition to their qualifications as also for recommending the grant of a charter to them.

- The output of such Societies has implications for manpower planning. In any exercise of supply estimation, whether conducted by NTMIS or any other agency, the contribution of such Societies should be incorporated.

Indian National Academy of Engineering is not a professional society of the type described above but an academy, much like the Indian National Science Academy, which is a fellowship of eminent engineers and technologists and aims, inter-alia, at promoting and advancing the practice of engineering and technology and the related sciences and their application to problems of national importance. It is also concerned with encouraging inventions, investigations and research and their application for development of both organized and unorganized sectors of the national economy. Given the complementarity in the broad concerns of the INAE and the AICTE, a close collaboration and cooperation between the two is desirable. A beginning has already been

made in the sense that a scheme of visiting professorship is being operated by the INAE on behalf of the AICTE. It is recommended that the scope of collaboration should be expanded and the AICTE should consider providing regular financial support to the Academy to facilitate its effective functioning and, thereby, helping to meet several of the AICTE's own developmental objectives.

7.5 Universities

A large number of institutions that fall in the domain of the AICTE are affiliated to Universities. The AICTE will, therefore have a significant interaction with them. There are broadly three issues that need to be considered in this context.

7.5.1 Approval Process

In the case of new institutions or programmes of degree level, whether undergraduate or postgraduate, Universities will naturally come into the picture. The coordination mechanism vis-à-vis Universities in the approval process have been highlighted earlier.

7.5.2 Three-year UG Programmes

There are some UG programmes, notably on Computers/IT and Management that are not being covered by the AICTE. As per current practice, such programmes of undergraduate level that are of 3 year duration are the responsibility of UGC and not of the AICTE. The argument given is that a 3 year degree programme is not a part of technical education but a 4 year programme in the same discipline, i.e. IT, is technical education. On the same logic, 3 year Management UG programmes are outside the scope of the AICTE. The definition of the term "technical education" in the AICTE Act does not create distinctions of this kind. Duration alone cannot be a basis for deciding whether the programme is technical or not.

Thus, keeping UG programmes on technical education of duration less than 4 years outside the purview of the AICTE does not seem logical. It is recommended that the UGC and the AICTE should jointly establish the criteria for deciding which programmes are part of the technical education system. It is to ensure that the AICTE can play a legitimate part in the planning and development of the entire technical education system, irrespective of the legal affiliations or duration of the programme.

Even if artificial barriers are maintained and the programmes referred to are retained with the UGC, as a special case, the AICTE should be associated with the programmes in such matters as norms, standards, curriculum, syllabus, etc. This would ensure conformance to the stipulations made in Section 11 of the AICTE Act. The UGC may be requested to prepare guidelines for this purpose in consultation with the AICTE and circulate the same to all the Universities.

7.5.3 Washington Accord

For degree courses in engineering, an international arrangement has come up for giving recognition to accreditation systems in various countries and making them members of the Washington Accord. The NBA is seeking membership of the Accord. Once NBA secure the membership, programmes accredited by the NBA would be automatically recognized by the member countries and the related educational qualifications accepted by them.

There are certain programmes in the universities, which are contributing engineering manpower especially for R&D although such programmes are not covered by the AICTE. In addition to programmes on IT referred to earlier, these are programmes on electronics, microwave, solid state physics, material science, etc. that fall in this category. Titles of the programmes do not project the contents adequately. Therefore, concerned University and the AICTE should examine jointly the details of contents to decide if the programme has sufficient engineering orientation to be regarded as capable of contributing technical manpower. In order to facilitate recognition for them under WTO/GATS, the NBA could take the initiative of facilitating recognition of such programmes under the Washington Accord.

7.6 R&D Organizations

Research is an integral component of technical education. The AICTE has an All India Board of Postgraduate Education and Research in Engineering and Technology. Section 10(d) assigns to the AICTE the task of promoting innovations, research and development in established and new technologies, and generation, adoption and adaptation of new technologies. Section 10(f) talks of linkages between technical education system and R&D organizations. Chapter 4 interalia recommends encouraging faculty members to take up Ph.D. programmes.

Linkages of the AICTE with R&D organizations could take various forms. Some of them are outlined here.

- On the logic that Scientific Departments and Agencies, as also R&D institutions under them, would be the primary beneficiaries of an enlarged supply of quality postgraduates and Ph.D.s from the technical education system, Rama Rao Committee had recommended the setting up of a high level committee, involving the AICTE and Secretary level functionaries in various Science Departments, that would coordinate the strategies and efforts of the AICTE and these Departments. This Committee should be activated and coordinated plans developed for strengthening Postgraduate and Ph. D. education in the technical education system. This forum could also be used for mobilizing financial resources from the user Departments and Agencies for the development of PG education and Research in the technical education system.

- Each Scientific and Technical Department, as also R&D agency of the Government, should allocate at least 1% of its budget for supporting postgraduate education and research in the technical education system.

- As recommended by Rama Rao Committee, facilities may be made available to 3rd and 4th year students of engineering to go as short-term apprentices for training in R&D organizations.

- In the Programme of Action following the National Policy on Education, 1986, it was recommended that major facilities for research and development which are too expensive for individual educational institutions to establish, may be established by the Scientific Departments within these institutions for joint use of the institution and the sponsoring Scientific agency. The institute and the Agency would manage these facilities jointly. Not much action has been taken to follow up on this recommendation. It is suggested that the high level committee referred to earlier should examine this and draw up a programme for the purpose.

- Often many institutions of technical education are unable to put up viable R&D proposals for funding by the AICTE or other agencies due to limited availability of relevant expertise internally. Such institutions could be encouraged to present proposals jointly with other institutions or the R&D institutions under other agencies. The strategy of co-ordinated projects has already shown considerable success. Nationally Co-ordinated Projects and Technology Mission Projects are a case in point.

Linkages of the AICTE with R&D organizations could be multi-dimensional. At present they are practically non-existent. The AICTE should set up a Standing Committee for making recommendations for coordinating linkages with the R&D system.

7.7 Recognized Institutions outside the AICTE

A number of institutions in the field of technical education are outside the ambit of the AICTE. They include IITs, IIMs and Deemed Universities including NITs. All such institutions are of high quality and reputation. It is not necessary that they be brought under the AICTE for regulation and control. However, their involvement with the AICTE will be mutually beneficial. They are an important resource system for supporting various initiatives such as curriculum development, teacher development, research and development, and creating capacities in emerging high expertise areas. While the AICTE has made good use of the individuals from these institutions in various committees and programmes there is a need for a more formal interaction with them on institutional basis. It is recommended that an AICTE–IIT Consultation Forum be set up which should meet regularly to discuss development of technical education and develop a synergistic approach to their respective efforts. Similar fora should be created with other institutional systems - the IIMs, NITs and the TTTIs.

7.8 Coordination with Ministry of Labour in respect of Industrial Training Institutes

Engineering manpower has broadly three segments, namely, professional level (degree and above), technician level (polytechnic diploma) and craftsmen level (ITI certificate). The AICTE has, under its Act, jurisdiction over the first two. Craftsmen level segment is quite large in size, but it is outside the AICTE. In fact, it is under a different ministry and there is practically no interaction of the AICTE with the ITIs.

Section 13(1) mandates the Council to establish, among others, an All India Board of Vocational Education. The Board will presumably be concerned with ITI level education as well as vocational education in schools.

ITIs have their own non-statutory council, namely, NCVT. There is a move to convert this Council into a statutory body. Coordination of the AICTE with NCVT is useful irrespective of whether the latter is a

statutory body or otherwise. Such coordination will complete the chain of technical education and give substance to the provision in Section 10(b), which states that the AICTE may "coordinate the development of technical education in the country at all levels". The All India Board of Vocational Education should, in conjunction with the Ministry of Labour, lay down the directions and modalities of coordination with the ITI system.

7.9 Coordination in respect of Non-Formal Programmes

Various organizations, commercial, corporate or otherwise, are offering non-formal programmes of varying duration, content and quality. Some of the programmes offered by them are of such a quality that their products get jobs readily in the employment market. However, there is no system of academic regulation or accreditation of such programmes.

Broadly, non-formal programmes are of 4 types, leaving out the distance education programmes such as those offered by the IGNOU, and training programmes offered by professional societies such as the ISTE:

i) Examinations are conducted by Government recognized agencies such as DOEACC and Open Universities.

ii) Degrees/ diplomas are awarded by foreign universities.

iii) Twinning programmes under which students can transfer credits to foreign universities after studying for a part of the programme in India.

iv) Others like those providing computer training in market and residential areas.

For the protection of students from sub-standard programmes and institutions, at present there is hardly any regulation or quality assessment except for programmes referred to in (i) above. The AICTE is now taking up work relating to foreign universities covered in (ii) above. It is important that the AICTE develops an approach towards the Non-Formal system and defines its degree of interface with them. It is not suggested that the AICTE should take over the task of approval and regulate them as it does for formal technical education. But it would not be tenable to adopt a position that the AICTE has nothing to do with the Non-Formal system.

the AICTE indeed has the responsibility to undertake coordinated development of technical education at all levels. It is recommended that a Standing Committee be set up to monitor the developments in the non-formal sector and evolve the position the AICTE should take up in the matter.

Apart from other considerations, non-formal programmes have a significant impact on the supply of trained manpower. If the NTMIS project is to be made more effective, the AICTE may consider modifying the coverage of NTMIS so as to include the products of non-formal programmes in the estimation of supply and monitoring of unemployment. Further, the AICTE may consider taking up monitoring the quality of selected programmes.

7.10 Coordination in respect of Entrance Examinations

Admission to many of the programmes approved by the AICTE is conducted on the basis of entrance examinations. For admission to similar programmes, examinations are being conducted by various examining bodies. As such, candidates have to appear for numerous entrance examinations for seeking admission to a programme of their choice. This causes undue hardship. Ideally, a single national admission test should be run, just as ETS runs GRE or GMAT – tests that are used for admission to prestigious universities in a large part of the world. AIEEE is an effort in this direction. The AICTE could examine how to move the system towards one nationally recognized system of examination.

While this happens in due course, the current picture is that most admission examinations are not designed scientifically to test abilities or potential for specific programmes. The objective is primarily to push the candidates, who may have passed examinations from different Boards, through a common sieve. Attempts to replace the multiple-agency examinations by AIEEE will take quite some time. Meanwhile, it is proposed that the AICTE may coordinate the working of examining agencies in the following directions.

- There should be coordination of dates and contents of various examinations for the convenience of candidates.

- Parameters required to be tested may be identified and appropriate methods for testing them may be evolved.

- Research may be undertaken to establish the efficacy of entrance examinations.

- Coordination mechanism may be developed for making improvements in entrance examinations on a continuing basis.

- Sights should be set on the ultimate goal of having a single entrance examination.

A serious limitation of the present system of admission is that it is based on a one-point examination. An element of continuous evaluation could be built into it by giving some weightage to Board examinations at class X and XII levels. A further improvement could be made by persuading the Boards to have some uniformity in the standards of examination and evaluation.

The AICTE should endeavor to reduce the number of entrance examinations, reduce it preferably to a single examination, have the examinations designed by professional experts, and incorporate the weightage of secondary and senior secondary examinations.

7.11 Interface with the Government of India

The AICTE has been set up by the Government, which has the authority to give it directions on questions of policy and even to supersede the Council, if necessary. These are normal provisions reserved for the Government to deal with extraordinary situations. The purpose is not to reduce the autonomy of the AICTE, which it needs to perform its obligations under the act meaningfully. It is important that the Government consciously endeavors to protect the autonomy. The AICTE should not be seen as a department or division of the government, which shall receive instructions from the government functionaries in its normal area of operation. Equally the AICTE should guard its autonomy vis-à-vis the government lest its credibility as an independent statutory authority is compromised. Instructions from the Government on matters of policy under Section 20, the Act stipulates, are to be received in writing.

An important dimension of the AICTE's autonomy is its ability to decide its structure, staffing pattern, creation or abolition of positions, floating new schemes and programmes and, establishing new formations necessary for its effective functioning. Instead of referring these matters for decision by the Government, the

AICTE should be allowed to take its own decisions subject to the requirement of adhering to well established administrative and financial principles, control of its own systems and procedures and, overall annual audit by the Government.

The Act also stipulates the membership of various bodies of the Council. Some positions are ex-officio, others are specifically appointed. Representatives from the Government are deliberately kept at the relevant seniormost levels, so that the bodies can undertake real decision-making in the meeting itself without having to refer back. With this in view, it is recommended that only those authorities and persons attend the meetings who are members in their own right. There is no provision for representing a member; this should be strictly observed so as to maintain the sanctity and dignity of these high bodies. However, where need arises for consultation with a non-member on a specific issue, the concerned person can be a special invitee to a particular meeting for that specific purpose.

CHAPTER 8

TECHNICAL EDUCATION IN THE CONTEXT OF GLOBALISATION

8.1 Present Status

Just prior to our independence in 1946, India witnessed one of the largest famines in the history of our nation, which made Mahatma Gandhi lament, "to the hungry god is bread". India, which used to import even pins and clips prior to our independence, has no doubt progressed considerably over the last five decades, thanks to the emphasis laid on the use of science and technology and incentives provided to achieve rapid industrialization. As a result of the implementation of these policies, the annual food production in the country increased from a mere 55 million to over 210 million tons, transforming the country from a food importer to a marginal exporter, despite three-fold increase in population. Installed electricity generation has gone up from a mere 2.3 million kw to over 110 million kw. Increase in the production of crude oil from 0.5 to 30 million tons, coal from 30 to over 240 million tons, steel from 1 to 20 million tons, a ten fold increase in metal products and industrialized goods. These are typical examples of the industrial growth achieved by India through successive five-year plans. The gross national product has likewise increased ten-fold in real terms and our annual export has gone up by more than a factor of ten to cross 55 billion dollars.

The initiation of green revolution, making India the second largest rice producer and fourth largest wheat producer, white revolution which has made the country the largest producer of milk and milk products and the brown revolution which has made us self-sufficient in edible oil production are indeed feats of excellence of which the nation can be proud. India's progress in nuclear technology likewise has made a significant mark. Our nation's developments in space technology and its extensive application for deriving practical benefits have become the envy of even the advanced nations. Indigenously fabricated, state-of-the-art INSAT satellites have initiated a communication revolution in the country. INSAT geostationary satellites are providing nationwide communication, broadcasting, distance education and disaster management services, enabling even rural population in the remotest corners of the country to receive the benefits of global connectivity, entertainment, developmental education, tele-health and real-time weather forecasting services. Indian Remote Sensing Satellites likewise, are extensively used to monitor and manage forestry, soil characteristics, water resources, agricultural crops, environmental pollution, command area development, land use practices and to initiate sustainable integrated development at individual watershed levels.

In spite of the significant advances in science & technology, India still continues to be a poor developing country where more than a quarter of our population is barely surviving below the poverty line, over a third is still illiterate, and a quarter do not even have access to safe drinking water, and more than half of our population suffers from lack of sanitation and poor quality of life. Our agricultural productivity even after the green revolution continues to be low at 1.8 tons/ha. as against the world average of 2.6 ton/ha., let alone the world's best of over 5 ton/ha. Rapid deforestation, intense soil erosion and poor management of land and water resources have rendered large tracts of once fertile land into alkaline and saline deserts. Unchecked industrial expansion and rapid urbanization due to explosive population growth have turned our major cities into mega-slums instead of making them engines of growth. The loss of lives, livestock and property due to recurring natural disasters is continuing to increase year after year, causing enormous suffering and misery, particularly to the most vulnerable segments of our society.

Even though our national GDP has crossed $550 billion, it is still less than a twentieth of that of USA. Per capita GDP of $450 is likewise a fiftieth of that in high income group of countries. Even in terms of Purchasing Power Parity income, our per capita income of $1,700 is just about a twentieth of that in USA, which makes India one of the poorest countries in the world. The present level of economic growth rate of just about 6% per year is totally inadequate considering that at least half of it is required as demographic investment to offset the additional demand due to population growth. India with 16% of global population has less than 2% of global land area, around 1.5% of forest, and accounts for only 1.3% of global GDP. Large scale illiteracy, out-dated manufacturing practices and poor infrastructure have made our industries inefficient and uncompetitive in the global market.

The primary reason for our industrial backwardness can be traced to the "Import Substitution Strategy" followed earlier, which essentially encouraged second-rate technology and manufacturing practices to thrive under licensing restrictions and protection strategies. In spite of political interferences, excessive staffing, bureaucratization, lack of transparency and accountability, our industries made profit in the past at the expense of the consumer, due to the captive internal market and protection from external competition.

With the inevitable liberalization and opening up of the Indian market to global competition in 1991 after joining the WTO, the Import Substitution Strategy was abandoned in favour of "Export Promotion Strategy". In advanced economies such as the USA, services sector now contributes over 70% of their GDP with industries and agriculture contributing 25% and 5% respectively. The developing countries are moving in the same direction, even though the growth in services and manufacturing industry sectors is still low. Our own national GDP, which

at the time of independence was predominantly agriculture based (56%), has now considerably changed wit services sector contributing 47%, industry 24% and agriculture about 29%. It is absolutely clear that the growt of industry and services sector must be much faster, if we have to achieve a minimum of 8% annual economi growth rate.

8.2 Information Revolution

Spectacular developments in space technology, digitalization and convergence of computer an communication technologies have initiated the new Information and Communication Technology revolutio making it possible to transmit and receive even terra bytes of information anywhere on our planet. With th establishment of wide band optical backbone, VSAT's, instantaneous internet connectivity and seamles multimedia networking through satellite, wireless, optical and cable delivery systems, information technolog has become one of the most powerful and decisive engines of socio-economic development in the 21st centur Information Technology is revolutionizing life on earth in a way that no other technology has done in huma history. While it took 38 years for radio and 13 years for TV to reach the target of fifty million users, interne has accomplished this in just under 5 years and has already evolved as a powerful medium of global E commerce.

Information and Communication Technology revolution has spearheaded the growth of knowledg societies breaking all geographical boundaries and barriers and bringing even remote areas into the mainstrea by connecting them to information super highways. With information being generated at the rate of 20 trillio bits a day, the vast databases available have become our modern encyclopedia. Inevitably the comparativ advantage has shifted to those nations and societies, which can instantaneously access, analyze, synthesize an disseminate the vast data bank of information available from multiple sources to enable them to effectivel compete in the knowledge-based global economy. The capacity to rapidly acquire, update and constructive use knowledge and information has become the crucial engine for the empowerment of people and societie Since low wage labour does not, any more, enjoy an advantage in a knowledge society, the developi countries like India can improve their economic status only by participating in the global value chain, whi requires efficient communication connectivity, universal internet access and adequate knowledge build-up f speedy decision making. However, the fond hope that globalization will enable developing countries to activ participate in the global value chain has unfortunately not come true, primarily because of their poor infrastructu lack of technical expertise and paucity of resources. Continuous dependence on advanced nations for lat

technology can never succeed in a technology apartheid regime, which is being ruthlessly practiced by the developed nations in their own economic interest. Consequently the digital divide between the haves and have-nots of cyber age has increased, further marginalizing the developing nations, which are unable to successfully penetrate the global market.

The poor performance of industries in India is primarily due to heavy dependence on imported technology, uneconomic scales of manufacture, rigidity of labour practices, low productivity and rapid setting of obsolescence. The level of productivity in the unorganized sector, which employs 93% of the total work force of about 400 million and contributes to almost 60% of the net domestic product, is still worse. The ratio of worker productivity in the organized to unorganized sector in manufacturing has steadily increased over the years from 7.6 in 1985 to over 16 in 1995. There is enough data to substantiate that the productivity gap between the organized and unorganized sector in non manufacturing sectors also is steadily increasing. Raising unorganized sector productivity has enormous potential for improving economic growth and lowering poverty. The only way to improve productivity in the unorganized sector is by enabling workers to use better technology, improving institutional mechanisms for marketing, providing financial assistance, offering appropriate technical training and making available efficient machinery, infrastructure and short-term retraining opportunities. The AICTE should set up a committee to work out its strategies and action plans for increasing the productivity in the unorganized sector.

8.3 Development of Human Resources for Industrial Growth

Education is the single most important factor which can enhance industrial productivity and improve the quality of life. South Korea and Taiwan enhanced their productivity and quality of products substantially during the mid seventies by providing excellent education and training to their technicians, thus helping their economy to grow at a very fast rate. Quality education and training in science and engineering disciplines is vital if we, as a nation, have to successfully compete in the global market place. India's phenomenal success in IT software industry is an excellent example of leveraging the knowledge and expertise of a large talented pool of English-speaking software experts within the country. With India becoming a competitive and attractive destination for outsourcing its services, Indian software industry has emerged as the fastest growing economic sector from a modest $150 million a decade ago to almost $9 billion, growing at an annual compound rate of over 40%. Closely following IT, Biotechnology has become the new pulse and the buzz reaching a target of $500 million in just about 5 years.

Notwithstanding, the penetration of IT enabled services within the country is poor, Internet connectivity is dismal and the use of information technology in our administration, industries and commercial sector continues to be at a very low rate. In spite of the significant capability achieved by India in space technology and multi-media networking, which can provide distance connectivity to any corner of the country, people in the remote areas still have no access to the global market, administrative reforms continue to be bogged down by bureaucratic hurdles and empowerment of the people at the poorest level remains a dream. However, there are isolated examples where people in a few remote areas such as in Dhar District in Madhya Pradesh (GYANDOOT), Haryana (DRISHTI) and Punjab (TARHAT) have benefited greatly by accessing IT enabled services. Rural farmers in such areas are able to profitably sell their agricultural produce by checking the latest market trend, receive agricultural and veterinary advice, access computerized land records and even sell their skilled products and services globally by creating their own web sites.

8.4 Structure of Technical Education and Globalization

While we repeatedly boast of having the second largest pool of engineers and scientists in the world, we must recognize that the number of scientists and technicians in the country per thousand people is less than 3.5 as against 110 in Japan or 55 in USA. Likewise, the number of R&D scientists and technicians in India is only 0.3 per thousand people as against 7.1 in Japan and 4.0 in USA (Table 8.1). While the proportion of scientists and engineers need not be in the same proportion as elsewhere, because of our large population, their quality has to be at par with that of scientists and engineers from advanced countries.

Table 8.1: SCIENTIFIC & TECHNICAL MANPOWER PER 1000 PEOPLE: AN INTERNATIONAL COMPARISON

Country	Scientists & Technicians (per 1000 population)	R&D Scientists & Technicians (per 1000 population)
Japan	110	7.1
Germany	86	4.0
Israel	76	5.9
USA	55	4.0
Korea	46	2.9
Brazil	30	0.2
China	8.1	0.6
India	3.5	0.3

Source: Human Development Report 1994, 1998 UNDP: Data corresponds to 1990-96

The graduates and postgraduates from our excellent institutions such as IIT's and IIM's have proved themselves at least comparable, if not better, than the graduates from the best institutions elsewhere in the world. If only we can improve the quality of technical personnel graduating from other institutions to the same level as that of IIT / IIM graduates, India will not only be able to meet its own developmental requirements, but can also take advantage of WTO/GATS rules to generate qualified technical people to meet the growing needs of other industrialized as well as the developing nations of the world. In order to take full advantage of the window of opportunity, however, India needs to restructure its technical education system and ensure that the technical education imparted in all our institutions is of the highest quality. Fluency in English language, which Indians have, is indeed an asset. There are already emerging opportunities with countries requesting India to set up quality institutions comparable to our IIT's and IIM's in many of the developing countries, in addition to a large number of foreign students seeking admission in our institutions. If the AICTE can ensure development of all our technical institutions to provide high quality education, India has the unique opportunity of exporting our educational services to the world at large.

Technical education needs to be appropriately structured to ensure availability of adequate number of high quality technicians, diploma holders, graduates, postgraduates and Ph.Ds in each discipline. We must ensure that quality is not sacrificed at the altar of quantity. The AICTE has to set up a separate centre to assess and forecast the number of diploma holders / graduates / PGs and Ph.Ds required to meet national demands and export obligations. The AICTE should proactively promote the export of technical education to ensure that we do not loose this unique, fast opening up window of opportunity. The AICTE must devise novel methods to set up world class laboratories, infrastructure and library facilities in several centralized locations either as a separate entity or attached to an existing institution, which can be accessed by students from all nearby institutions. The fact that technical institutions are generally concentrated around major cities can be taken advantage of in setting up of such common facilities. Library networking needs to be promoted on a large scale to enable teachers and students to have access to the wealth of literature available.

The Committee is fully convinced that the AICTE is the rightful body for planning, organization and administration of education in architecture and town planning, management, pharmacy, hotel management and applied arts, even though some of the members of the professional bodies in these areas have expressed otherwise. Professional bodies can and should only get involved in the development, coordination and advancement of professional careers of technical graduates coming out of the educational institutions. By their very nature and constitution, professional bodies are not capable of taking up the promotion and management of technical education, which has many facets. The importance of multi-disciplinary education in developing true professionals is well recognized throughout the world, which can only fructify under an organization like the AICTE which deals with different technical, engineering and management disciplines.

Just as architects and town planners have to acquire knowledge of structural engineering, earthquake engineering, environmental protection strategies, etc., pharmaceutical education must include modern methods of drug design, manufacturing processes and testing and evaluation methods. Management must address integrated management including health, environment, infrastructure, resources and technological obsolescence related issues in addition to human resource, financial and administrative management, to be in tune with the modern day demand. Applied arts involve a considerable amount of engineering, manufacturing, and management knowledge. The exquisite bronze idols in the temples in South India used investment casting techniques, as long ago as 13th-14th century, which was totally unknown elsewhere in the world. Today a large number of high precision instruments including highly sophisticated gyro's use the same technique, although the process being used now has become highly sophisticated. The AICTE, can bring about synergy among various disciplines and enable our technical graduates and postgraduates in all areas to have access to the best integrated education.

8.5 Quality of Technical Education

The future of the country depends on the quality of technical education we impart in our institutions and the type of practical training we provide to enable the future generation of engineers to become competent innovators, designers and product manufacturers. The rising unemployment of scientists and engineers in the country is primarily due to (i) poor quality of our graduates coming out of our technical institutions (ii) lack of entrepreneurship, partly due to the limited availability of venture capital but mostly due to the inability of our students to venture and (iii) poor growth in the industrial sector.

It is increasingly clear that the organized sector in any country and particularly in India can only provide a limited number of jobs. Even the job availability in the manufacturing industries is generally smaller than the percentage of growth. The vast majority of technical graduates have to find jobs either in the service sector or preferably be trained to seek independent jobs and become entrepreneurs. The quality of training in the institutions, their linkages with industries, and involvement of experts from research institutions and industries, thus becomes an extremely important and integral part of technical education. The Committee believes that the Government must make it mandatory for all industries, including small-scale industries, to employ qualified diploma holders or engineers for all technical jobs in order to become competitive in the global market. The existing or presently employed personnel who do not have technical qualifications must be sent for training by the industries to enable them to acquire knowledge of the latest trends and practices, of quality control and production techniques.

We must recognize that we cannot become world-beaters by resorting to the use of obsolete technology from advanced countries. In addition, the global commercial interest of multinational companies, embargoes

and sanctions by sovereign countries under various pretexts such as dual use capability, security, level playing field etc., will generally prevent us from obtaining access to the latest technology. Even when outsourcing from India is done, it is based on the availability of cheap labour, enabling the multinational companies to cut their own costs, and are generally confined to limited parts / packages and not the entire branded product. Unfortunately, even though India has done fairly well in basic research, it has often failed in converting its research capability into marketable branded products. For example, while India has carried out creditable research in liquid crystals, super conductors, optical communication, nano-materials, MEMS, biotechnology, advanced materials, pharmaceuticals etc., it has failed in fully exploiting the results of basic research for making globally marketable products. Innovation, turning creative ideas into marketable products leading to value addition, is essential for surviving in the global competition. Further, obsolescence in many areas such as in electronics is so great that the power and capability of the devices are doubling and cost is halving every eighteen months. To avoid obsolescence, the technical education imparted should ensure that our graduates and postgraduates are well equipped to keep up with the latest technology and changing market needs.

While undergraduate education in technical and engineering disciplines needs to be improved considerably, the postgraduate and doctoral programs particularly in the engineering disciplines need to be restructured and vastly improved if India as a country has to successfully compete in the global economy. The outturn of Ph.Ds' in India is of recent origin. Even though the first doctorate in electrical engineering was produced by Guindy Engineering College in 1946, the number of Ph.Ds became at best a handful only after 1957 with Banaras Hindu University and IIT's getting into the act. Even after 50 years of the doctoral program, the number of engineering and technical Ph.D's coming out of all our institutions is only 375 per year as against 4000 Ph.Ds in basic sciences. 90% of the engineering Ph.Ds come from 12 institutions which include IIT's, IISC, Universities like Jadhavpur, Anna, Banaras and University Department of Chemical Technology, Mumbai. The largest number of Ph.Ds are in the disciplines of mechanical engineering (22.5%), and civil engineering (16.7%) followed by chemical engineering and technology (14.6%) and electrical engineering (10.9%). Rama Rao Committee has recommended that the number of Ph.Ds be increased to at least 750 per year to meet the faculty requirements of even the existing institutions, in the ratio 1:2:4 for professors, readers and lecturers as per the norms laid down by the AICTE. The number of Ph.Ds required will go up by at least a factor of two, when our major industries are forced to employ more Ph.Ds to keep them innovative and forward looking and be able to compete in the global market.

In order to make Indian industry globally competitive, it is vital to build strong linkages between technical institutes / research institutions and industries. This will materialize only when industries are mandatorily required to spend a part of their earning on carrying out high quality research. While in many advanced countries, industries contribute significantly to the research being carried out; Indian industries contribute precious

little to our national research efforts. Poor appreciation of research by even major industries is a legacy of the past IS strategy, where industries, protected from external competition, got away by selling less than the state-of-the-art products. Even in the absence of any quality control, poor productivity and low reliability, Indian industries made profit by selling their products at a much higher price than elsewhere, because of the State protection from outside competition. Industries must also be incentivised to forge strong links with our technical institutions and support research in these institutions. The Committee strongly recommends that each industry be mandated to spend at least 10% of its gross profit towards carrying out their in-house research and supporting research activities in other technical institutions.

8.6 Intellectual Property Rights and Patenting

Technical education in particular must also include a background on the modern concept of intellectual property rights and patenting procedures. India has generally been quite lax in this respect. This has greatly affected our industrial progress and revenue earning capacity even in disciplines and products where India has been a pioneer. The number of patents filed by India in 1996 was just 1700 as against China which filed 12000, Japan -34000, Germany -57000 and USA-120,000. It is only since the last 10 years that CSIR has been making a concerted effort to educate and assist technical people in filing patent rights to protect and benefit from our knowledge base. Many reputed institutions elsewhere such as MIT, Stanford, Harvard etc., have a small group of experts whose main responsibility is to identify new inventions, facilitate their industrial production and ensure that appropriate steps are taken to protect the intellectual rights, the benefit of which gets shared between the inventor and the parent institution.

The Committee considers it very important that we supplement our technical education with knowledge of better management practices, industrial requirements, quality consciousness and intellectual property rights in the context of globalization. The Committee also recommends that at least our major research and technical institutions, such as IIT's, IISC, NIT's etc., and also industries be encouraged to establish a small team of experts whose responsibility will be to identify new products and inventions, promote their manufacturing and protect the rights and privileges of the inventors and their institution.

CHAPTER 9

TASKS AHEAD AND ROLE OF THE AICTE

9.1 Preamble

Till now, the AICTE may be said to have been passing through its infancy phase. During this period, it has seen considerable quantitative growth, but with comparatively less emphasis on quality and discipline. It has now reached teenage where discipline and pursuit of excellence have to be inculcated.

While science is universal, technology is situation specific. Technology has also a higher component of skill. Further, technology education encompasses a far greater variety than science education does. That large variety imposes an onerous burden on the AICTE.

In this context, the futuristic role and tasks lying ahead of the AICTE have been identified as follows

1. Technology development and practice have significant social impacts, and economic costs. They also involve the management and the cooperative efforts of large numbers of people. Hence, technology education cannot stand all by itself; it requires an understanding of society, economy and human resource management too. Technology education is incomplete without an understanding of these diverse branches of learning.

2. Admittedly, in quantitative terms, the AICTE has succeeded in expanding technical education much beyond expectations. It might be argued that the AICTE has played a relatively passive role, and the thrust of expansion has emanated mostly from private enterprise. However, the tardy progress in some states goes to show that private enterprise cannot succeed without a conducive environment. If the AICTE had not been pro-active, few technical institutions would have come into existence anywhere in the country. In other words, the phenomenal expansion of technical education over the past decade is proof enough that the AICTE has been a benign factor, one that placed no impediments to entrepreneurial efforts, and possibly encouraged them as well. On the other hand, the fear is the AICTE has been over liberal, has let technical education expand beyond sustainable levels.

3. In a couple of years, WTO regulations will come into force. They are simultaneously both a threat, and an opportunity. Already, the CII and the IITs are planning to open a campus of the latter in Singapore.

There is a formal request from Sri Lanka to the same effect. If these pioneering efforts succeed, there will undoubtedly be requests from many more countries, and opportunities to spread Indian educational institutions across the globe. At the same time, advanced countries will try to exploit the Indian market, and some have already started to do so.

4. Hence, more than quantity, quality is critical, particularly in the expanding global economy. Over the past decade, Indian technology has not only held its own against international competition, it has also made fresh inroads in such diverse areas as space systems, nuclear engineering, military hardware, biotechnology, automobile engineering, heavy industries, civil engineering, and of course, Information Technology. Indian engineers are much in demand all over the world. So far, contrary to what sceptics fear, India has succeeded in establishing a number of institutions that are able to educate youth to international levels. At the same time, neither intellectual nor physical resources are available in adequate measure in most other institutions. Few of them are keeping pace with the phenomenal explosion of knowledge in technology. Unless remedial steps are taken, quality will suffer. If that happens, according to Gresham's Law (bad coin drives away the good), even well established quality institutions may lose their élan.

5. As Indian technical education will have to meet global standards, and global competition, it is no longer desirable (as has been the practice so far) to allow new institutions to be established as and when demanded without recourse to their utility and quality.

6. Youngsters may at times join arts and science courses out of pure interest, as a means of liberal education. In contrast, technology education is invariably sought after as a means for securing lucrative employment; it is virtually unknown to seek technical education as liberal study. Hence, it is not enough for technical education to be of high quality; it should also satisfy the economic purpose of providing a satisfactory career.

7. For this reason, technology education should closely match in quality, in variety and in quantity what the market needs. Any mismatch in any one of these three parameters will lead to unemployment or under-employment, and cause social distress. It could have serious political repercussions too.

8. National policy dictates that all teachers should have undergone postgraduate education. However, as not many postgraduate trained candidates are available, most institutions are appointing bachelor degree holders only as teachers. Steps should be taken to see that all teachers get postgraduate training within a few years. Those institutions that refuse to cooperate should be penalized, for instance, by cutting down the numbers they can admit and, if necessary, by closing them.

9. University education in India is beset with historical problems associated with the practice of "affiliated colleges". The rigidity of this system, its inability to maintain quality standards, and poor student and faculty discipline that it breeds, have led to the proliferation of "Deemed Universities". Unfortunately, this facility is being misused. Many of these universities are not managed by academic faculty, and some are even commercial in nature. The AICTE has a special responsibility to monitor their performance, and ensure high standards of academic quality in Deemed Universities, and may require special powers to discharge that responsibility.

10. Recent Supreme Court judgments have given an impression that universities are virtually free to take decisions on their own regarding constituent colleges, and that private institutions are free to decide their fee structure independently. Deemed Universities appear to have the same (or even more) autonomy than traditional ones. In all these matters, the legal authority the AICTE can exercise is not clear. The AICTE will have to intervene decisively to enforce academic and administrative discipline in Deemed Universities in order to ensure that they fall in line with desired standards of quality. One Deemed University, with relatively poor credentials, has started hundreds of "study centres" all over the country, and is admitting students in large numbers all over the country even though it has no academic or physical resources. Unless such misuse of autonomy is nipped in the bud, Deemed Universities can cause much harm to technical education.

11. Universities are proud of their autonomy, and sensitive to any encroachment on their traditional freedoms. At the same time, several of them have failed to maintain self-discipline that is concomitant with the exercise of freedom. Whatever be the degree of autonomy that the universities have, by law, the AICTE has the responsibility to ensure that proper standards are maintained even in university institutions. The Government would be well advised to reiterate this responsibility of the AICTE, and direct the UGC to provide all possible help to the AICTE to gather data and other information to assess the quality of education provided in university technical institutions. It should also be the duty of the AICTE to educate the public on the level of education, and the academic standards maintained by each technical institution, including those that lie within the university system.

12. Admissions to technical institutions and the fees charged by them have become complex issues, and will remain so for foreseeable time. Till about a decade ago, India largely followed the European practice of the state meeting most of the cost of higher education, including technical education. In recent years, as in the US, private institutions have begun to dominate. However, there is a difference. In the US,

prestigious private universities possess large endowments. They are in a position to provide substantial subsidy to meritorious students. It is not widely known that the median average fee in universities like Harvard and MIT do not exceed the amount charged in major state universities like the University of California by more than 20 per cent. Prestigious private universities spend more per student than most state universities do. And therefore, they offer, on the average, more subsidy than state institutions do. It is, therefore, important to reiterate that quality private institutions are not supposed to meet the cost of education entirely from fees, but subsidize it substantially through endowments. A similar policy should be the norm in a poor country like India, where many meritorious students are poor. In its own interest, India should stop treating higher education as a business, geared mainly for rich students, the way it is at present.

13. Recently, mass media have exposed widespread corruption in the matter of admissions. Yet, richer sections of the public prefer leaving technical education to market forces, and like it to operate as a business. In this milieu, the AICTE has a new kind of responsibility. The Government should examine the possibility of giving the necessary powers to the AICTE to deal with such matters.

14. The aspirants to technical courses in reputed institutions are far in excess of the seats available. Common entrance tests have been used to handle the problem. However, existing common entrance tests devalue school education. Many students cease to bother about maintaining discipline in the final years of school education. By and large, entrance tests have affected the value system, the culture of candidates to professional education. It has made them mercenary. Coaching schools that have proliferated all over the country have given an undue advantage to rich students who have the means to pay the heavy expense of such training. Hence, there is a need to evolve a robust system that will satisfy the needs and aspirations of different class of students and colleges, and prevents damage to the character of impressionable youth. The AICTE should develop a suitable programme of two-tier entrance tests as recommended by the Review Committee in Section 4.1.6. The AICTE should also initiate wide-ranging research to develop suitable techniques that will enhance the validity, consistency, and reliability of admission tests.

15. Private institutions have proliferated in India because the Government is unable to bear the cost of satisfying the rapidly increasing speculative demand from students. On the other hand, the Indian economy has been growing only at a compounded rate of 5-6 per cent. Global competition demands that the productivity of Indian engineers should increase. Combining these two factors of growth rate

and productivity, India can sustain a growth rate of [illegible]-3 per cent a year in technical education. Even if the country achieves the 8 per cent rate of growth hoped for by the Planning Commission, the country will not sustain a growth rate higher than 4-5 per cent per year in technical education.

16. The speculative explosion in technical education began around the year 1981 at which date the total enrolment in engineering and architecture at the university level was 115,000. That jumped to nearly 200,000 by the year 1986, and the sanctioned intake currently is 363,281, which corresponds to a total enrolment of 1.45 million in these two undergraduate courses alone. These are surely much in excess of the employment growth. According to the 55th Round of the National Sample Survey, non-agricultural employment in the secondary and tertiary sectors grew from 94 million in 1983 to 157 million in 1999, but in the organized sector, the growth was from 24 million to only 28 million during the same period. Hence, while overall employment increased by two-thirds, the growth in the organized sector, was barely 15 per cent. Further, according to the Economic Survey 2001-2002, emoluments in the Public Sector increased 16 times during the period 1981-1982 to 2000-2001 whereas the GDP in current prices grew by only 12.5 times. Yet, public sector wages are lagging behind those in the private sector.

17. Thus, we are witnessing two cross currents: One, the rapid increase in emoluments are tempting more and more youth to join technical education programmes, which offer the best prospects for high wages. Two, the growth in employment itself is dismal. Assuming that 1981-1982 was a reasonable year for enrolment in technical education courses, even assuming that employment in technology and management will follow the national rate rather than the slower organized sector rate, the Indian economy will probably absorb only a 75 per cent increase between 1981-1982 and 2003-2004. In other words, that comes to barely 200,000 for engineering and architecture, or an intake of barely 50,000 – some 7 times less than the sanctioned figure. These are approximate estimates, subject to correction. However inaccurate they may be, they do indicate a gross mismatch between what the economy can support, and what has been sanctioned by the AICTE. There is an urgent need to conduct a systematic study to determine the numbers that will be reasonable for intake to technical education. At least in the future, the AICTE should approve expansion of education on a rational basis, and not merely respond to the speculative demand to start more courses.

18. The figures given here for the economic demand are approximate. The AICTE should work out more accurate figures. In this connection, the number of alumni of any college that secured employment commensurate with the education received and for the first time might be used for guidance.

19. There are three beneficiaries of technical education: One, the student who can expect a lucrative career; two, the employer for whom the services of technically qualified persons is a necessity; and three, the society at large, which benefits from the professional services rendered by technologists. On this basis, the Sarkar Committee, which launched the IITs, proposed that the cost of education should be equally borne by the student in the form of fees, by the state (on behalf of the society) in the form of grants, and by business through endowments and projects. The practice in the United States too is similar as the following table indicates:

University	Costs ($)	Assistance ($)	Admissions (Numbers)	Applications (Numbers)
Harvard	33110	22946	2082	18693
Stanford	32471	21284	1598	18363
Berkeley	19284	10906	3609	30803
California IT	27663	20202	205	3515

(Ref. Home Pages)

It is also useful to note that the average fees paid by students varied between $ 5600 and $ 11,000. Even the higher figure is barely 30 per cent of the nation's per capita GNP. If India were to encourage technical education as well as the US does, and make such education as affordable as it is for American citizens, fees in technical institutions should also be pegged to 30 per cent of India's per capita income, or Rs. 6000 per year.

20. Compared to these figures, the actual fees charged in most private colleges in the country are astronomical, and may be even described as anti-social. Such high fees is the consequence of the state virtually absolving itself of the responsibility to fund technical education and handing it over to self financing colleges where the students are expected to bear the full cost. It is unjust, and even unwise to make technical education unaffordable to capable but poor students. The idea that they should take loans for the purpose is not good because that is an imposition on the poor. Section 10(n) of the AICTE Act expressly directs the AICTE to "take all necessary steps to prevent commercialization of technical education". Hence, the AICTE is duty bound to evolve a fair and realistic financing mechanism that will keep fees within just limits, and yet support the expansion of technical education, but only to the extent needed by the economy.

21. Typically, the cost of technical education in India is Rs. 50,000 per student per year, and even on highly generous terms, it need not exceed Rs. 100,000 a year per student. Thus, the total cost of engineering and architecture education for a realistic enrolment of 200,000 amounts to Rs. 1000 crores normally and Rs. 2000 crores exceptionally.

22. The total cost of Rs. 2000 crores, as estimated above, is ...h a modest amount that the state (after deductions from contributions from employers) should be abl... to bear the burden on its own. However, such support should be confined to the true economic deman...d of technical education, and not the far larger speculative demand that we are witnessing these days.

23. As emphasized earlier, those in the technical profession get private benefits in the form of more lucrative careers. Hence, it would not be unreasonable to demand of them a modest cess of 1-2 per cent of their earnings towards the education of future technical professionals. As employers too are beneficiaries of technical education, they too may be asked to make a matching contribution. In that manner, the balance of the expenditure to be borne by the state may be reduced to about a third of the total cost of technical education. As a matter of abundant precaution, and to prevent the money from being diverted to other uses, the entire sums collected may be kept in an escrow account earmarked for technical education only.

24. These funds may be disbursed either by a special committee constituted for the purpose, or by allowing the contributors to choose the institutions (and the purpose) for which their contributions may be utilized, or a mix of both approaches may be tried. The former has the advantage of allowing national level planning, and freedom to support less endowed institutions. The latter will meet emotional needs better but the funds may be concentrated on a few already well-endowed institutions. The Review Committee feels that it would be best to keep the entire amount collected in this manner in an escrow account, and have a National Committee decide on the manner in which it should be disbursed among different institutions.

25. Self-financing private institutions may be allowed to meet the speculative demand from students, but the state should look after the much more modest needs of realistic growth. In that case, only that number of students should be selected each year according to acceptable criteria and they all should get education at affordable rates – on an average, around 30 per cent of per capita income (Rs. 6000 per year at current prices), with poor students getting it virtually free. A suggestion was made that fees should be linked to that paid in school so that those who study in expensive schools will pay more. The Review Committee suggests that the implications of this proposal should be studied by the AICTE.

26. Commercialization of education has had adverse effects on the character and attitudes of students and parents. They are losing their idealism, becoming mercenary. Instead of worshipping Saraswati, they adore Lakhsmi exclusively. This is not desirable for the good of the society. This commercial attitude has resulted in most institutions devaluing the study of social sciences. The AICTE has its work cut out to change these retrograde attitudes. At the least, it should lay down minimum norms for familiarity with social sciences and societal problems.

27. The AICTE should interact with bodies engaged in the promotion of science and social sciences, and consistently maintain a dialogue at the level of committees for reviewing, assessing and modifying the inputs of science and social sciences to the educational preparation of engineers.

28. The NBA should continue to receive support from the AICTE for its functioning but its administration and governance should be autonomous within the overall framework of the Council. The NBA would organize its own inspections and make its recommendations to the AICTE as stipulated in the Act., but as a separate independent professional organization.

29. For an enrolment of 200,000 students, 14,000 teachers will be needed. Assuming that a Ph.D. will have a career of 30 years, in the long run, the country will have to add 450-500 Ph.Ds a year to support teaching alone. The immediate problem is much more acute because a large backlog has to be made up. It appears that the Indian university system should be able to generate 700, or even 1000 Ph.Ds a year in engineering and architecture alone. The AICTE should survey the extent of the need for doctoral and Master level programmes at least to meet the demands of teaching and take steps to augment such programmes.

30. Whether the teachers are to be trained up to the Ph.D. level, or merely to the M.Tech. Level, such training is essential for good teaching. Hence, it is desirable to treat postgraduate education as a pure public good and not as a non-merit good in the manner some economists advocate. If the numbers are confined to what the economy needs, even at the enhanced figure of 1000 Ph.Ds a year, the cost to the Government will be no more than Rs. 50 crores a year. That is such a small sum that the AICTE should consider funding the entire cost of providing doctoral training to future teachers and researchers.

31. There is a curious dissonance between the availability of students and faculty. Aspirants for technical education are plenty; many of them are bright. In contrast, not enough qualified persons are willing to teach; the few that are willing are often of poor quality. Thus, we have a surfeit of choice for student admissions but scarcity in faculty selection. Hence, while the AICTE will need to restrict student admissions, it will have to incentivise more qualified persons to join the teaching profession.

32. It is physically impossible to find enough teachers immediately to educate the full student intake that has been sanctioned already. The problem has been aggravated by the insistence on paper qualifications, like M.Tech. and Ph.D. At the same time, large numbers of experienced engineers are retiring from various R&D and other technological establishments. It is more than likely that their knowledge will be as good as that of fresh M.Techs, or even Ph.Ds, if not better. The AICTE permits such persons to teach even if they do not have a master's degree. That facility should be exploited as much as possible, but essentially as a temporary measure.

33. In recent years, communication technology has seen a revolution both through advances in space technology, and because of the explosive expansion of the internet. Both offer novel methods for large masses of students to receive lectures by top experts. This is another innovation that the AICTE has to vigorously pursue.

34. Most states have established technical universities that centralize education of all technical institutions in the state. In some cases, over a hundred technical institutions are put together in one straightjacket. So much centralization is likely to impede flexibility and educational innovation too. The system of technical universities has reduced variety. It has also isolated technical education from other disciplines. Formation of technical universities is no substitute for granting academic autonomy to colleges.

35. On the other hand, technical universities can provide valuable support to private colleges by organizing digital libraries, experimental facilities on the lines of Regional Sophisticated Instrumentation Centres, strategies for electronic teaching and the like. The universities may also organize research and development on educational technology, pedagogy and such innovations that will exploit recent advances in communication engineering.

36. Traditionally, management of education has been left to amateurs who have no formal training in Education Management. The AICTE would do well to take the initiative and enforce compulsory management training for education administrators through short and long courses. Such systematic management training and research on education management is no less critical than M.Tech. and Ph.D qualifications.

37. The TTTIs were established for the purpose of training polytechnic teachers, and conducting research in pedagogy and educational technology. The Government may consider upgrading the TTTIs, for conducting research on the processes of education at higher levels.

38. While the numbers in technical education are excessive for the country as a whole, their distribution is uneven. Southern states have excessive intake while others, particularly those in the North and the East suffer from acute scarcity. Many meritorious students in those regions are thereby denied access to technical education. For that reason, the AICTE should evolve special schemes to encourage the expansion of technical education in under developed states, and do so even though, for the country as a whole, student enrolment is already excessive. At the same time, it should consider freezing of further expansion in states where intake is more than 50 per cent higher than the national average.

39. So far, the AICTE has left the issue of quantitative expansion to market forces, and permitted unchecked growth without reference to the actual manpower requirements of the country. Taking advantage of the large demand from students, and ignoring the realities of economic conditions, many over enthusiastic

(and some unscrupulous) entrepreneurs have over expanded technical education. Hence the AICTE should shrink excess flab in technical institutions in a relatively painless manner by insisting that student admissions should be strictly restricted to the number that can be handled by the available faculty and no more. The AICTE should even close institutions, which are not up to minimum standards.

40. Regrettably, the all too rapid expansion of technical education has resulted in the mushrooming of colleges, most of whom are unable to provide even minimum quality of education. In Tamil Nadu, where expansion has been greatest in recent years, in the current II semester examinations conducted by the Anna University, no student passed in 5 colleges, 28 had less than 5 per cent passes, 78 less than 10 per cen passes, 108 less than 15 per cent passes, and only 17 had more than 40 per cent passes with only 8 having more than 50 per cent passes. The situation in other states, which had gone for rapid expansion (as in Maharashtra) is not very different. Obviously, when these colleges come up for accreditation after 5 years of operation, most of them will fail. In spite of likely political pressures, it would be humane to close down such incompetent institutions. A few may be allowed to continue with reduced enrolment in case they have qualified faculty but not in sufficient numbers. However, such reduction may make those institutions financially unviable. Hence, even their case, it would be a mercy to close them down rather than prolonging their agony, and the misery of the students who are misguided enough to enroll in them.

41. Globalization is already having an impact. Several foreign universities are offering off-site teaching programmes in the country. The promise of a foreign degree is naturally a great attraction. It is not clear how good their academic programmes are, and how well they compare with what they are in their home country. As there are many universities of dubious reputation in developed countries, it is also possible that our youth fall prey to institutions of no value. In order to protect our youth, the AICTE should monitor and regulate this invasion. In particular, it would do well to insist that foreign universities can operate in India only when they satisfy the norms for local institutions The AICTE should be armed with necessary powers to penalise defaulters. Just as foreign universities are coming to India, there is a demand for Indian institutions to establish offshore campuses in other countries. If care is not taken, such exercises may bring a bad name for the country. The least the AICTE should do in this regard is to check that such export meets at least Indian standards.

42. This situation imposes a heavy responsibility on the AICTE to inform the general public on the quality of education available in technical institutions. Accreditation takes a long time, and is, in any case, an occasional exercise. For that reason, the AICTE may publicize a few pertinent data on the colleges under its jurisdiction. Purely as an indicative instrument, the following data may be put out every year around the month of December when students will be deciding on writing entrance tests;

- Admissions: lowest, highest and median marks of students admitted in the previous year.
- Student Performance: Number qualifying in GATE examination, highest GATE scores.
- Employment: Number of firms visiting for campus interviews; the highest, the lowest and the median salaries offered, and the total numbers employed during the previous year.
- Faculty: Number of teachers with M. Tech. qualifications, number with Ph.D.s; number with more than five years experience; student-teacher ratio.
- Faculty Performance: Number of papers published in refereed journals; total value of sponsored projects completed, consultancy projects completed.
- Academic Support: Number and person-days of teachers attending seminars, as also refresher courses.

43. The AICTE's role in university institutions appears to be legally ambiguous. The AICTE may have to adopt a carrot-and-stick policy to ensure that university institutions too fall in line as far as quality is concerned. Or else, the prime objective of having the AICTE would be negated. For that reason, Section 2(h) of the AICTE Act should be amended to drop the words "not being a university".

44. According to statute 10(i), the AICTE has the responsibility of promoting professional bodies. The Indian National Academy of Engineering is the premier body composed of the most distinguished engineers in the country, and drawn from all sections of the profession. The AICTE should support the Academy and help it to interact effectively with other similar national bodies both within the country and elsewhere.

45. It is recommended that the Boards should be made more autonomous in relation to their academic functioning. Further, the recommendations of the Boards on academic issues would be accepted as a convention unless the Executive Committee considers any specific recommendation to be contravening the purposes of the AICTE. Such steps would also facilitate better coordination with those Boards which deals with subject for which there are other statutory bodies.

46. Many Universities around the world have established Science and Technology Parks (STEP) to promote technology entrepreneurship, to improve science/industry interaction, and to generate additional revenues. The AICTE is best suited to introduce similar experiments in India.

CHAPTER 10

SUMMARY AND RECOMMENDATIONS

10.1 Preamble

The AICTE has been in existence for the last 15 years. The mandate given to it is clearly enunciated in the AICTE Act of 1987. There has been a phenomenal growth in technical education since the AICTE became a statutory body. Besides, with the advent of liberalization and globalization there has been a mushrooming of private institutions, including foreign ones as also an increase in various courses in Information Technology and service sector related courses. The primary mandate given to the AICTE for proper planning and coordinated development of the technical education system throughout the country, the promotion of qualitative improvements and making proper norms & standards for the growth of technical education remains, but its role and functions have increased manifold. With India emerging very prominently on the global scene in Information & Communication Technology, the increasing challenge before the AICTE is to ensure world-class education through the institutions it approves & accredits. At the same time, in line with the tasks assigned to it, the Council has to ensure coordinated development of Technical Educational Institutes across the country.

10.2 Terms of Reference

A Review Committee was set up by the Ministry of Human Resource Development in November 2002 under the Chairmanship of Prof. U.R. Rao, former Chairman ISRO with the following terms of reference:-

i) To review the functioning of the AICTE and to assess whether it is in accordance with the objectives for which the statutory body was set up;

ii) To re-define the role of the AICTE in view of the emerging changes;

iii) To review implementation of various schemes of the AICTE as well as its process of granting approval and to suggest modifications/improvements required;

iv) To examine the aspect of coordination of activities of the AICTE, UGC, Subject matter Councils, State Governments and to suggest steps for further improvement within the framework of the AICTE Act; and

v) Any other item as deemed fit by the Committee.

10.3 The Approach

The Review Committee had extensive discussions with all stakeholders. It conducted a detailed performance appraisal to assess the growth of education in the various disciplines covered by the AICTE and delineated the issues and the problems being faced. Based on this, the areas that need to be addressed in the future and the tasks ahead were identified. Considering the centrality of the AICTE to the whole of technical education system, the Committee felt that the review and revitalization of the AICTE cannot be disassociated from the revitalization of the technical education system as a whole.

The Review Committee has deliberated on the issues that emanate from the roles and responsibilities enunciated in the AICTE Act. These, inter alia, include improving and maintaining high standards of quality in technical education, promoting the establishment of institutions in heretofore uncovered regions to ensure coordinated development, promoting postgraduate education, encouraging more candidates at an early age to train for faculty positions as there is an extreme shortage of well qualified teachers, encouraging and promoting continuing education, promoting research, monitoring the growth and performance of Deemed Universities, promoting equity in the matter of admission, fee charged, and remuneration paid to teachers, etc. A critical issue that was discussed and highlighted in all the meetings was the need to match technical manpower requirement to the economic demand, in a rapidly changing environment. The need to have better industry institute interaction and encouraging more private participation in unserved areas were other issues that were deliberated. The objective is to ensure that technical education which requires heavy investment does not lead to unemployed/ underemployed/unemployable youngsters.

The Review Committee has made detailed recommendations regarding all the issues that were discussed and has suggested short-term and long-term strategies for the future development of technical education in all its aspects. In line with these was felt the necessity to gear the administrative structure of the Council to meet the emerging challenges of the day. Accordingly, specific recommendations have been made for enlarging, upgrading and improving the structure of the Council as also its regional offices. The fact that there were only 96 technical institutions, when the Council was established, and now there are over 4000 institutions, would alone justify the need to restructure the Council. The AICTE needs to be well supported and strengthened to enable it to fulfill its mandate in the dynamic globalised environment of new information age.

10.4 Performance Review of the AICTE Functioning/Activities

10.4.1 Planning and Coordinated Development

10.4.1.1 National Forecast of Technical Manpower

(Sec.10(a) of the AICTE Act) ***(Ref. Chapters 4 & 9)***

An accurate forecast of technical manpower requirement in various disciplines is extremely important to plan for an orderly growth of institutions and their geographic distribution. While there has been an explosive growth in the number of technical institutions in the country particularly during the last two decades, non-availability of qualified faculty in required numbers, inadequate infrastructural facilities combined with slower economic growth, industrial recession and the geopolitical situation have resulted in a large number of engineers unable to find suitable employment. According to a recent estimate of the Planning Commission the unemployment rate of engineering graduates exceeds 20%.

Recommendations:

1. The National Technical Manpower Information System (NTMIS) must be strengthened to generate and continuously update the database on the supply and demand of technical manpower in all the disciplines which come under the purview of the AICTE including diploma holders, graduates, PG's and Ph.D. in pharmacy, architecture and town planning, management and applied arts as also certificate level education dealt with by the Ministry of Labour. Only a realistic economic demand and not a speculative demand as a basis for planning technical education will prevent the mismatch between demand and supply.

2. The NTMIS must undertake state-wise data collection and analysis of labour market requirements, provide a full profile of the resource situation and forecast faculty requirements on short and long-term basis.

3. The State Government and the AICTE should agree to utilize manpower planning as a key factor for approving new institutions and programmes and altering intake in existing institutions. Manpower planning should depend on Manpower demand and supply within the State as well as nationally, and adjusted, within small limits, to the special requirements of legitimate social and political considerations.

4. For an agreed manpower plan the State Government should work closely with the NTMIS and the AICTE and

   - Provide a scenario of future demand and supply of technical manpower in the State based on the NTMIS information and its own plans of industrial growth.
   - Project special requirements, with due justification, on the basis of broad indicators/norms agreed to by the AICTE.

5. The creation of a separate center under the AICTE, a "Centre for Human Development in Planning of Technical Education", (CHRIS) with dedicated experts of its own, is recommended for generating and continuously updating the database on the supply and demand of technical manpower at each regional level.

   - Reports from this centre should be widely disseminated to facilitate a better control in the development and management of technical institutions to meet the changing national needs. The information should be disseminated widely to State Governments, students, parents and employers for a better understanding of the labour market situation.

10.4.1.2 Growth of Engineering & Technology Institutions

UG Education

(Ref. Chapters 4, 8 & 9)

The total number of Degree Engineering Colleges increased from around 158 institutions in 1980 to over 337 in 1990 and from 337 to over 776 in 2000. Today there are 1208 engineering degree colleges (with a total intake of over 3.5 lakh students), 986 of which are in the category of self-financing institutions. Added to this are 1006 MCA and 930 MBA Degree Institutions with an intake of about 53,000 and 64,000 students respectively. The growth in Pharmacy, Architecture and Hotel Management and Catering Technology follows the same trend.

Recommendations:

1. The Committee recommends a much stricter control in giving further approvals to new Institutions especially in the South, South-West and Western Regions, to slow down further proliferation of institutions in these regions.

2. No further expansion of UG technical institutions should be allowed and approvals for new institution should be stopped for at least 5 years in States where the UG students intake exceeds the national average of 350 per million population.

3. Technical Education imparted to our graduates and postgraduates must ensure that they are not only well equipped but also able to keep up with the latest technology and market trends.

10.4.1.3 PG Education & Doctoral Education

(Ref. Chapters 4 & 9)

There is an acute shortage of faculty for imparting Postgraduate education as discussed in Section 4.2 in detail. The number of Ph.Ds in the engineering discipline coming out of Indian institutions is just about 400 per year, 80% of which are from IIT's, some universities, NITs and IISc., Bangalore. In the field of Business Management, Hotel Management, Architecture and Pharmacy the availability of Ph.Ds is practically negligible. Requirement is of over 10,000 Ph.Ds in the next 3-4 years to meet the requirements of UG and postgraduate education.

Recommendations:

1. The Committee recommends starting of a 5 year integrated M.Tech. programme in selected high quality institutions after 10+2. The candidates selected for such integrated programmes could be given a scholarship or stipend of Rs.5,000/- per month during the first three years to be raised to Rs. 10,000/- during the last two years to attract the best students to go in for integrated M.Tech., provided they bind themselves to be in the teaching profession for at least three years.

2. Existing TTTIs, with a minimal support, can also be encouraged to start integrated M.Tech Courses.

3. The postgraduate and doctoral programmes, particularly in the engineering disciplines need to be restructured and vastly strengthened for India to compete successfully in the global economy. The number of Ph.Ds needs to be increased to at least 750 per year if the ratio of 1:2:4 for Professors, Readers and Lecturers is to be achieved.

4. Major industries should be asked to employ more Ph.Ds to keep them innovative and updated to compete in the global market.

5. The AICTE should survey the extent of the need for doctoral and Master level programmes in all disciplines to meet the demands of teaching and industry.

6. PG and Doctoral education should be treated as a pure public good and not as a non-merit good. The AICTE should fund this education. The committee strongly recommends that the AICTE enhances the stipend and provide other amenities and incentives to the PG and Doctoral students, which must be at least comparable, if not better than what they could get, had they joined service after their graduation.

7. The AICTE must create a national cadre of teachers in various disciplines. Wide publication of the list of pool teachers among all the institutions will enable the early filling of vacant faculty positions.

10.4.1.4 Regional Inequity in the Growth of Technical Institutions

(Ref. Chapters 4 & 9)

More than 52% of the engineering institutions are located in the South and South-West whereas East and North account for just around 7% and 10% respectively. 43% of MBA institutions and 59% of MCA are in the South and South-West, while the remaining are in the Central, East, North and North-Western areas. For Pharmacy and Architecture, the same situation prevails. In Hotel Management, almost 50% of the institutions and the intake are in the South-West alone, that also mainly in Karnataka.

Recommendations :

1. The AICTE and the Government are responsible for coordinated development of Technical Education and as the entire cost of Technical Education cannot be met by fees alone, Government must play a part in facilitating the setting up of institutions in regions where there are none or insufficient.

2. (i) Two National institutions of technology in the unserved areas should be set up in each plan period; (ii) Joint venture should be entered into with private industries in such regions for funding new institutions; (iii) Institutions should be set up by the Central Government run, for a few years and then handed over to the State Government or a private enterprise through a Build-Operate-Transfer (BOT) method; (iv) Bharat Shiksha Kosh should be used for funding the establishment of institutions in unserved areas; and (v) Distance education facilities should be extensively used. A small committee of experts should be set up to examine the different methods in detail for implementation.

3. Proactive support of private enterprises through tax incentives by the Central Government, provision of free land and basic infrastructure by the State Government and promise of reasonable support from the AICTE for acquiring facilities and equipment would encourage many private enterprises to start new institutions in uncovered areas.

4. The AICTE should dialogue with State Government authorities of Northern and North-Eastern States and encourage them to create a conducive environment and provide proactive support to promote private initiatives.

5. A systematic study should be done to determine the intake required so that the expansion is on a national basis and not in response to a speculative demand. The large demand that is being witnessed these days is mostly speculative, and much in excess of the actual needs of the economy.

10.4.1.5 Approvals for Starting of New Institutions

(Section 10 (k) of the AICTE Act) ***(Ref. Chapters 4, 7 & 9)***

Steps have been taken by the AICTE to reduce the approval cycle for starting technical institutions, new courses and fixing intake and for simplifying the procedures. However, the approval still takes 8-12 months.

Recommendations :

1. Any approval to start a new institution must be a two-step process. The first "in principle" approval for 2 years may be based on the present criteria of assessing physical assets and financial viability as also the detailed project report. The final approval for admission of students should be given only when the laboratory and infrastructural facilities, computer-networking system, library facilities are well established and qualified teaching staff is in position. This may be given for 5 years at a time, depending on performance being satisfactory.

2. The Committee endorses the recommendations of the Ashoka Chandra committee 2001 and recommends rigid application of these to prevent fly by night operators.

3. The Committee recommends the suggested ratio of professors to assistant professors and lecturers be used as a minimal guideline. Flexible complementary scheme should be adopted to provide career growth to deserving scholars.

4. The student to teacher ratio should be 15:1 except in the case of Architecture where it should be 10:1 and in no case should the ratio fall below 20:1

10.4.1.6 Selection of Students for Admission to Technical Institutions (Section 10 (o) of the AICTE Act) *(Ref. Chapters 4 & 7)*

More than 5 lakh school students seek admission every year and face the difficulty of preparing and taking multiplicity of entrance tests.

Recommendations:

1. The Committee strongly urges the AICTE to evolve a more rational and streamlined two-tier process for the selection of students. The first-tier could be an objective, type national entrance test involving Optical Mark Reader (OMR) based on common minimum nationally accepted syllabus, to be held simultaneously at different centres in the country, the results of which, alongwith appropriately weighted marks obtained at class 10 as well as 10+2 stages could be used for short-listing candidates eligible for the second test, which should be a more comprehensive and rigorous one.

2. NRIs and foreign students, who wish to join Indian institutions must also be subjected to the same test, which can be held at selected centres outside India.

3. A single national list of eligible candidates can be evolved for use by various institutions anywhere in the country.

4. Selection be done twice a year to ensure students who miss out in the first opportunity have a second chance to prove their credentials.

5. The AICTE should consider setting up a separate autonomous national testing organization and initiate wide ranging research on testing methodology.

10.4.1.7 Fixation of Fee *(Ref. Chapter 4)*

Clause 10 (n) of the Act makes it the responsibility of the AICTE to take all steps to prevent commercialization of technical education. Many unaided institutions are charging exorbitant fees.

Recommendations:

1. The AICTE should take positive steps to prevent all types of commercial exploitation. The AICTE should immediately constitute a small committee of experts to examine the financial viability of the institutions, both Government-aided and private, to fix proper guidelines on the quantum of fees to be charged from students of different categories. The poor meritorious students in Government and Private institutions should be suitably subsidized.
2. The cost of education should be shared by all the beneficiaries including students, employers and society to enable the deserving poor to access quality education. The fees should not be more than a third of the cost of education.
3. Those in the technical profession should be required to pay a cess of 1 to 2 percent of their earnings towards the education of future technical professionals. The amount should be kept in an escrow account earmarked for technical education only. The employees, who are also beneficiaries, should make a matching contribution. A special committee should be constituted for managing the account.

10.4.1.8 Regulation of Foreign Universities/Institutions Imparting Technical Education *(Ref. Chapter 4)*

A number of Foreign Universities/Institutions have entered the field of technical education in India either directly or through collaboration arrangements with Indian Universities/Institutions or private parties. The Committee appreciates the action taken by the AICTE for issue of detailed Regulations for Entry and Operation of Foreign Universities/Institutions. The step taken by the AICTE will go a long way in ensuring that only high quality technical education, universities/institutions come to India.

Recommendations:

1. It is recommended that strict enforcement of the Regulations issued must be ensured and punitive action should be taken against all defaulters.

2. The AICTE should take steps to acquaint the public about the Universities/Institutions that are recognized by it so that gullible students are not taken for a ride by some fly by night institutions.

10.4.1.9. Distance Education *(Ref. Chapter 4)*

1. The Committee recommends the early implementation of a suitable nationwide distance education system to provide access to the best possible education to all the students. This will also help teachers to be well equipped with the latest technology and market trends.

2. The AICTE must make it mandatory for technical institutions to set up receiving facilities with interactive channels for asking questions and obtaining clarifications.

3. Efforts should be made to make the entire system self-financing (or by and large self-financing).

10.4.1.10 Promotion of Technical Education for Women, Handicapped and Weaker Sections. *(Ref. Chapter 4)*

According to Section 10 (e) of the Act, the AICTE is required to "Formulate Schemes for Promoting Technical Education for Women, Handicapped and Weaker Sections of the Society".

No specific schemes have been formulated for promoting technical education for women, the Weaker Sections of the Society or for the Handicapped.

Recommendations:

1. Disaggregated data for male and female enrolment in various disciplines should be collected and maintained in the AICTE.

2. The AICTE should conduct a study of the problems faced by women, the handicapped and the weaker sections of society regarding their access to technical education, as also during the period of their education and subsequent employment. Based on the findings of such a report, the AICTE should formulate specific schemes for them.

3. The AICTE should consider a development scheme for providing accommodation for women students in all institutions, and particularly in the private sector ones as the lack of accommodation is a major problem faced by women.

10.4.2 Faculty Development *(Ref. Chapters 4,6 & 9)*

Assuming that the total all India intake capacity of 3,59,721 for engineering graduates in 2002-03 remains constant, the number of engineering undergraduate students for the four-year courses would be 1,438,884. The total requirement of teachers for a teacher student ratio of 1:15 in engineering alone would be 95,924 composed of 13,703 professors, 27,407 readers and 54,814 lecturers. The shortfall to meet the minimal requirement based on specified qualification norms is over 26,000 Ph.Ds and over 30,000 M.Techs or a total of over 56,000 teachers. 930 business management institutions today have less than 4,000 teachers against 8557 teachers. Business management schools, with the exception of a small number of reputed institutions have just four teachers per institution on an average.

Recommendation:

1. The Committee recommends the following short-term and long-term strategies for tackling the problem of shortage of well qualified faculty in various institutions.

10.4.2.1 Short-Term Measures for Faculty Development

Recommendations :

1. The AICTE should widely publicize, including on the web, the total vacancy positions along with qualifications required, both within India and outside.

2. Appointments may also be made quickly through a fast track method for candidates from abroad.

3. The AICTE should institute a continuing teaching assistant programme in leading institutes like IIT's, NIT's and QIP centres for those pursuing M.Tech or Ph.D. Bright B.Tech./M.Tech. students could be appointed as teaching assistants on attractive emoluments (Rs.10,000-15,000/- pm) and other benefits, after undertaking a bond from them to serve as teachers for a minimum period of 5 years after their PG degree.

4. To encourage better linkage with industries and research establishments, institutions must be encouraged to offer adjunct Professorships to technical experts working in research institutions and industries, on an attractive honorarium, for teaching a course of 12-15 lectures each year.

5. Reputed faculty from leading institutions should be encouraged to spend a month or two at a time convenient to them, in institutions suffering from acute shortage of faculty.

6. The AICTE should encourage employment of retired persons of repute, up to the age of 65. Experienced engineers retiring from various R & D and other technological establishments, even if they do not have a Masters' degree, are allowed to teach by the AICTE, this practice should be encouraged further.

7. The AICTE should provide financial support for all new faculty members to undergo a teachers' training programme.

8. The AICTE must strengthen the Quality Improvement Programme (QIP).

9. The AICTE must immediately put in place a comprehensive distance education scheme in all disciplines to enable students and teachers to have access to the latest technological developments and market trends.

10.4.2.2 Long Term Strategies *(Ref. Chapters 4 & 9)*

Recommendations:

1. All institutions including private institutions must be directed to necessarily depute 5% of their staff for postgraduate/Ph.D education on half the salary by taking a bond to serve in the institution for a period of 3 years after the acquisition of their degree. The AICTE must provide the other half of the salary (or full salary) and additional expense towards relocation of the deputationist.

2. Premier institutions having research facilities such as IIT's, IIM's, IISc. etc., may be asked to increase the intake for Ph:D and M.Tech.

3. The AICTE should make it mandatory for each industry, and technical institutions such as CSIR, DOS, DAE, DRDO, and National Laboratories to take 3rd and 4th year graduate students as short-term apprentices for training. The number of such apprentices should be at least 5% of the total number of technical people working on the rolls of these industries/institutions.

4. Early Induction Programme for around 1000 truly bright students, selected on the basis of merit and aptitude at the end of the second year should be encouraged to take up faculty position after successful completion of their course. Attractive stipend to complete their course and support for obtaining

postgraduate degrees should be given, provided they are willing to give a 3 year bond to serve as teachers in any of the institutions under the purview of the AICTE.

5. An attractive scheme of sabbatical should be offered for teaching staff wishing to improve their qualifications.

6. Consultancy should be encouraged and suitable rules should be framed and enforced in such a manner as to ensure that teaching does not suffer.

7. At least 10% of the institutions in all disciplines should be assisted to run Masters and doctoral courses. The AICTE should provide special assistance to these institutions to be selected by a Committee.

8. Integrated programme leading directly to an M.Tech Degree in 4 years after B.Sc. should be considered for introduction in addition to the integrated M.Tech degree of 5 years.

9. In order to provide a conducive environment to enable more qualified persons to join technical education institutions as teachers, the AICTE should create model service and career opportunity rules for teaching staff of private and Government-aided institutes.

10.4.3. Technical Teachers' Training Institutes

The following recommendations of the TTTI Review Committee (2000) should be implemented as expeditiously as possible.

Recommendations:

(a) The TTTIs should be made national centres for training in education technology for teachers and trainers both from educational institutions and industries.

(b) The TTTIs should be funded to expand their infrastructure and raise them to international standards.

(c) The TTTIs should train teachers in the distance education system.

(d) Multimedia and language laboratory facilities should be upgraded to current international standards.

(e) Specific grants should be given to enable the faculty of TTTIs to conduct research in pedagogy using modern electronic media.

10.4.4 Accreditation *(Ref. Chapters 4, 7 & 9)*

As on May 2003, only 895 programmes from 202 institutions have been accredited as against a total of about 28,000 programmes in 3589 accreditable institutions. 53 of these are Government and Aided institutions (9.3%) out of a total of 567 such institutions and the rest 149 are private institutions (4.9%) out of a total of 3022. Over 90% of technical and engineering graduates are studying in non-accredited institutions. The 3,000 – 4,000 programmes which will come up for re-accreditation every year, 12,000 experts and 36,000 experts days every year will be required.

Recommendations:

1. The AICTE must simplify the accreditation process without compromising on the rigour of the process.
2. Accreditation must be brought under the direct supervision of a separate Vice-Chairman with adequate supporting staff.
3. A better understanding be forged with Universities and UGC, for the process of accreditation.
4. Except in the cases of unaccredited new programmes, accreditation may be carried out institution-wise, through 3 or 4 appropriate experts who can cover all the major programmes.
5. A national register of experts drawn from IIT's, NIT's, Universities, research institutions and industry experts and retired eminent teachers must be drawn up and updated every other year to facilitate easy identification and appointment of expert teams.
6. Accreditation for all programmes scoring over 650 be given for a duration of 5 years, with the specific clause that those scoring between 650 and 750 will not be reaccredited after 5 years unless they improve their score to 750 or above.
7. Accreditation must take into account additional features such as the percentage of the students passing in the examinations, their placement record, quality of linkage of the institutions with industries and research establishments etc.
8. Institutions, which are accredited, must be put on a web and well advertised to make students as well as their parents aware of the quality of institutions they are joining.

9. Those institutions, which do not get accredited, must be severely warned and given two years to enable them to make up the shortfalls, failing which they should be de-recognized.

10. Accreditation of any institution of technical education, whether under UGC or outside it, should be the responsibility of the NBA to ensure that there is a common standard and procedure for accreditation of technical education.

11. The NBA should organize its inspections independently and make its recommendations to the AICTE as stipulated in the Act, as an autonomous professional organization.

12. For degree courses in engineering, an international arrangement has come up for giving recognition to accreditation system in various countries and making them members of the Washington Accord. NBA is seeking membership of the Accord. This will be a useful and necessary arrangement, which should be pursued.

10.4.5 All India Boards of Studies *(Ref. Chapter 4)*

The AICTE has constituted nine Boards of Studies and four other Boards for advising the Executive Committee on academic matters including norms, standards, model curriculum, model facilities and structure of courses.

Recommendations:

1. The Boards should prepare model syllabus for all subjects and give wide publicity to them, which must be periodically updated to prevent obsolescence.

2. The AICTE should closely interact with the various professional councils, regarding the syllabi, practical experience etc., to ensure that the graduates do not have any problem in getting them registered.

3. The Boards should be able to choose the academic issues it considers important to deliberate. The Executive Committee should rely on the Boards to examine academic issues in-depth and give their considered opinion and recommendations, which should be placed on the agenda of the Executive Committee. The recommendations of the Board on academic matters should be accepted as a convention unless the Executive Committee considers any specific recommendations to be in contravention of the purposes of the AICTE.

4. In order to continually renew the Boards without losing the institutional memory, one-third of the members may be retired at the end of each year by rotation and replaced with new members.

5. Recently, the AICTE decentralized the approval process for diploma programmes to the state level. While the approval process may have been decentralized, the AICTE still has a role on various issues including norms and standards, syllabus, faculty development etc. The AICTE has an All India Board of Technician Education. The expertise of the Board should be utilized to develop coordination mechanisms with polytechnic education.

10.4.6 Functioning of the Regional Committees *(Ref. Chapter 4)*

There are at present 7 Regional Committees located in the Central, Eastern, Northern, North-Western, Southern, South-Western and Western Regions. These Committees are headed by senior academicians appointed for a three-year term by the Chairman, AICTE.

Recommendations :

1. Regional Committees should be substantially strengthened and empowered to take all necessary action on all matters coming under their purview. An expert committee of eight persons drawn from academia, research, industry should be set up under the chairmanship of a person of high academic qualification and integrity, preferably from outside the region. The director of the regional office should be a full time appointee of the AICTE.

2. The Regional Committees should be empowered to issue approvals, accreditation etc., and also appoint expert committees. This will substantially reduce the work load at the AICTE HQ., which needs to only entertain complaints, if any, and act as an appellate authority.

3. Bi-annual meetings between the Chairman, AICTE and the Regional Committees should be held to review the performance.

10.4.7 Appointment of Personnel at the AICTE HQ. and its Regional Subsidiaries *(Ref. Chapter 4)*

The present practice of appointing people only on deputation in both the AICTE HQ and its Regional Offices is responsible for most of the vociferous complaints from various institutions including

delay in obtaining decisions. Short-term appointment of both academic and non-academic persons to various positions has resulted in lack of continuity when the deputationists go back after their stint in the AICTE, leaving the new incumbents to learn the system all over again.

Recommendations:

1. The Committee strongly recommends that the practice of relying on short-term deputationists alone needs to be stopped with immediate effect. The AICTE must be allowed to have at least 50% of the senior academic and non-academic staff on a permanent placement and only 50% of the requirement to be met through deputationists.

2. Provision should be made to ensure at least 3 months of overlap between the outgoing and incoming incumbents to ensure continuity and smooth running of the AICTE operations.

3. The structure of the AICTE should be as recommended in Chapter 4 with function wise Vice-Chairmen at Headquarters. The Chairman, AICTE should be in the scale of Secretary to the Government and Vice-Chairmen at the AICTE HQ should be in the scale of Additional Secretary to the Government of India. The Directors of the Regional Offices and Headquarters should be in the scale of Joint Secretary to the Government of India. The number, position and emoluments of other staff at both the Headquarters and at the Regional Offices may be appropriately fixed.

4. In the appointment of senior officials at the levels of Chairman, Vice-Chairmen, Directors and Joint Directors, care should be taken to provide adequate representations to all major disciplines.

5. Apart from the recommended administrative restructuring, the following issues need to be addressed at the HQs:

   a) There should be more delegation of powers, which at present vest mainly with the Chairman and the Member Secretary, to the proposed Vice-Chairmen and further, to the officers below. Regulations may be framed accordingly.

   b) There should be a senior administrative officer who should attend to the administration; house keeping and coordination between bureaus in so far as holding of meetings, etc. are concerned. To the extent possible, the senior technical officers, should be left free to attend to the technical aspects of the areas allocated to them.

c) Officers at all levels should not be shifted around and should be fully accountable for the area assigned to him/her, as their frequent shifting is not in the interest of administration. If there is a need to shift anybody, it should be according to a transparent transfer/placement policy.

d) Steps should be taken to arrange for replacements well in time before the tenure of present incumbents end so that there is no gap in postings. In fact the new incumbent should take charge from his/her predecessor with a proper briefing note, handing over of listed files etc. This is in the interest of maintaining the memory of the organization and fixing accountability of the officers.

e) If an officer on contract/deputation is good and needed, his contract/deputation should be extended well in time with approval from his parent organization, and the post need not be re-advertised.

10.5 Special Issues in Management, Pharmacy and Architecture Education *(Ref. Chapter 5)*

10.5.1 Management Education

Management education has grown rapidly in recent years, with over 930 institutions at present. This rapid expansion has brought up a number of issues which impact on the quality of management education.

Recommendations:

1. Management Education needs to institute research into and develop new education and training programmes including entrepreneurship for under-served sectors like agriculture, transport, tourism, PSUs, energy, government administrative systems, social and service sectors like education, health and environment, informal production and service sector, etc.

2. The AICTE should set up an expert group to study the needs of these sectors and suggest specific programmes that should be launched in management education sector.

3. Considering the need for managing diverse and rapidly changing technology, ever changing market situation, increasing consumer demand for quality, etc., it is important that a variety of programmes are offered for practicing executives.

4. Currently, the AICTE, does not concern itself with undergraduate programmes or with part-time programmes in management, a number of which are coming up both nationally and abroad. The AICTE should develop its position vis-a-vis these programmes and deal with them suitably.

10.5.1.1 Education Material Development

Recommendation:

1. The AICTE should institute a specific scheme for stimulating preparation of a wide range of educational material based on Indian experience, Indian management practices - both current and traditional- and Indian cultural values, so that management schools can provide high quality and contextually relevant management education.

10.5.1.2 Faculty Development

Recommendations:

1. The AICTE should encourage better-endowed institutions to start Fellowship/ Ph.D programmes and short modular programmes in the evening for practicing managers.

2. The AICTE should expand the QIP for management teachers.

3. Special teacher training programmes should be organized for faulty specialized in economics, commerce, psychology etc. but recruited for teaching management courses, to convert them into teachers of management.

10.5.1.3 Research in Management

Recommendations:

1. The AICTE should encourage research activity by management institutions by extending its support to them to carry out research. A separate scheme for research support to management institutions should be developed, taking into account the special requirements of management research.

2. The AICTE should aim at supporting at least 100 quality research projects each year. Research output and publications should be given significant weightage, for promotion to higher levels.

10.5.1.4 Accreditation of Management Education Programmes.

Recommendations:

1. Quality, norms, standards and accreditation of the entire management education system, whether under the universities or in postgraduate diploma institutions of Management should be the concern of the NBA. The AICTE norms should apply to all institutions in terms of faculty and other criteria which have a bearing on quality

2. PGDM programmes by autonomous institutions which meet the AICTE criteria of approval should be permitted in addition to affiliated MBA programmes.

10.5.1.5 Management Council of India

Recommendation:

Management education should remain part of the AICTE, as there is a close inter-relationship between management and engineering and a separate Management Council is not desirable.

10.5.1.6 National Academy of Management

Recommendation:

A National Academy of Management should be established with support from the AICTE and it should work in close cooperation with the AICTE.

10.5.2 Pharmacy Education

10.5.2.1 Role of the AICTE in Pharmacy Education

In recent years, Pharmaceutical industry has become highly technology intensive requiring technology oriented professionals. Further, biotechnology, which is crucial to the growth of

pharmaceutical industry, is an important technological area under the purview of the AICTE. Therefore, pharmacy education is best served under the AICTE.

Recommendations:

1. Pharmacy education should be planned, regulated and developed by the AICTE as per the AICTE Act. There should not be dual control by the AICTE and the Pharmacy Council in educational matters.

2. Norms and standards of the AICTE in respect of teacher student ratios, teacher qualifications, infrastructural requirements etc., should apply to pharmacy institutions. However, the AICTE may involve and consult the PCI and professional bodies in the process of evolving its norms.

3. Accreditation of pharmacy programmes should continue to be the responsibility of the NBA and the accreditation process of existing institutions should be expedited.

10.5.3 Architecture, Town Planning, and Applied Arts Education

Recommendations:

1. More undergraduate and PG programmes in town/physical planning should be introduced in order to improve the physical environment of habitations. Emerging areas like environmental planning and design, landscape architecture, urban development management, traffic and transport planning, architectural conservation, disaster management, etc. should be considered.

2. An expert committee may be set up by the AICTE to identify new areas in architecture and town planning where new programmes should be established/expanded.

3. The AICTE should clarify and elaborate its role vis-à-vis applied arts and develop a programme of action to fulfill its identified responsibility in this area.

10.5.4 Hotel Management and Catering Technology

Recommendations:

1. Three-year programmes being run by many institutions are accepted by the industry, whereas the AICTE has stipulated a four-year programme. This confusion should be resolved early. Irrespective of

the duration of the course, education in Hotel Management and Catering Technology should come under one institution for the purpose of maintaining standards, giving approvals and accreditation.

2. The AICTE should examine and determine its precise role and responsibility regarding new courses, curriculum, teacher development, accreditation etc.

10.6 Review of the AICTE Schemes *(Ref. Chapter 6)*

10.6.1 Modernization and Removal of Obsolescence (MODROBS)

Recommendations:

1. Proposals for modernization should cover a whole department instead of just one laboratory. The current restriction on creation of new laboratories should be removed.

2. Provision should be made, where necessary, for construction of accommodation for housing the equipment, procurement of specialized equipment where required, air conditioning, and vehicles. Likewise, provision should also be made for maintenance and for purchase of accessories/peripheral devices, which expand the usage.

3. Allocation of funds for the scheme should be substantially increased and on a realistic basis.

4. Common facilities at strategic locations should be created and modernized regularly by the AICTE for the benefit of neighbouring technical institutions/industries, on payment basis.

10.6.2 Research & Development Scheme (R&D)

Recommendations:

1. Research is a crucial educational strategy and should be promoted across the entire technical education system and not confined to only a few institutions.

2. The funding for research by the AICTE should not use the previous year's expenditure as a base line. The criteria for inviting and evaluating project proposals should be different from those used in R&D Projects aimed solely at technology development. A revised scheme should be prepared with a considerably higher outlay.

3. All institutions receiving R&D funds should submit a detailed progress report every year.

4. For monitoring of projects, instead of the institutions making presentations, physical verification by expert's teams should be organized at least once in three years to the major recipient institutions. Upto 10% of the institutions receiving research grant should be physically monitored every year.

5. Block grant for a period of three to five years should be provided instead of yearly grants, continuation of the grant being based on a critical peer review of the project. If funds are misutilized, the institute may be required to refund part or all of the funds provided.

6. The principal investigator should be given the flexibility to use part of the project grant to give project appointment to young engineers, as research assistants who can eventually be potential faculty members.

10.6.3 Thrust Area Programme in Technical Education (TAPTEC)

Recommendations:

1. Technical education institutes should build up and continue specialized research and teaching programmes in a number of thrust areas.

2. The time horizon for funding under the scheme should be longer, minimum of 5 years, which could go up to ten if needed.

3. Funding under the scheme should be enhanced, and institutions like the IITs and NITs should be covered under the scheme.

10.6.4 Nationally Coordinated Projects (NCP) Scheme

Recommendations:

1. A strong coordination should be achieved by the Coordination Committee to ensure that the participating institutions and the funding agency identify and deliver the identified outputs. The scheme should be recast accordingly.

2. Disbursements to individual institutions by the funding agency should be based on the advice of the Coordination Committee.

10.6.5 Industry Institute Partnership

It is vital to build strong linkages between technical institutions/research institutions and industries. This is in the interest of all concerned. The AICTE has two schemes as below for this purpose.

10.6.5.1 Industry Institute Partnership Cell (IIPC) and National Facilities in Engineering & Technology with Industrial Collaboration (NAFETIC)

Recommendations:

1. Industries must be incentivised to forge strong links with the technical institutions and support research in these institutions. The committee strongly recommends that each industry be mandated to spend at least 10% of its gross profit towards carrying out its in-house research and supporting research activities in technical institutions.

2. New educational approaches including cooperative education, competency based teaching, sandwich model etc., should be seriously experimented with, by having close collaboration between industry and institutions.

3. The Government must make it mandatory for all industries, including small-scale industries, to employ qualified diploma holders or engineers for all technical jobs in order to become competitive in the global market. The presently employed personnel who do not have technical qualifications must be sent for training by the industries to enable them to acquire knowledge of the latest trends and practices, of quality control and production schemes.

4. The Committee recommends that under NAFETIC Scheme, the AICTE should establish a few Technology Business Incubators (TBI) in specific thrust areas of technology around major technical institutions and industrial centers in the country to enable young entrepreneurs to start new ventures as is being done in other countries. The Committee recommends that the AICTE set-up at least 10 TBI's with a seed funding of Rs. 20 crores spread over 3 years. Such auxiliary industries can also feed the larger industries located around the TBI parks.

5. The success of an institution in building healthy interaction with industry should be used as one of the parameters of granting accreditation

6. The AICTE should set up a Task Force to work out a comprehensive strategy for building industry institution interaction and to suggest a bouquet of schemes for implementation by the AICTE.

10.6.7 Entrepreneurship and Management Development Scheme (EMD)

Recommendations:

1. The scheme should be redesigned to focus on entrepreneurship development, preferably linking the AICTE and DST initiatives.

2. Every student should be given entrepreneurship education/training during the 3rd and 4th year of undergraduate training. Some could be assigned projects related to entrepreneurship.

3. Apart from promoting a policy framework in support of entrepreneurship, linking institutional efforts with such initiatives as STEP and Technology Incubation Centers should be given serious consideration by the AICTE.

10.6.8 Schemes for Management, Pharmacy and Architecture Education

Recommendation:

The AICTE should examine reasons for insufficient proposals emanating from non-engineering areas and evolve a proactive strategy for more development funding flowing to these disciplines. Separate schemes should be developed to meet the specific needs of these areas.

10.6.9 Miscellaneous Schemes

10.6.9.1 Scheme of Travel Grant

Recommendations:

1. The AICTE should provide full assistance to the deserving faculty members, particularly for attending conferences, seminars and symposia.

2. There should be no age restriction for necessary travel grants, even though preference could be given to those under the age of 45 and those who come from relatively less endowed institutions.

3. The AICTE should give wide publicity to this scheme.

10.6.9.2 Schemes of Seminar Grant

Recommendation:

Funding for the scheme should be enhanced. The AICTE could aim at supporting around 100 such events annually.

10.6.9.3 Scheme of Emeritus Fellowship

Recommendation:

The number of fellowships should be increased and the amount of fellowship should be enhanced to Rs. 25,000/- a month excluding pension and linked with pay-scale revision. Emeritus professors should also be provided housing, transport and other amenities available to the regular staff.

10.6.9.4 Scheme of Visiting Professorship/Adjunct Professorship

Recommendation:

The number of fellowships should be increased as also the honorarium. Appropriate accommodation and transport facilities and TA/DA should also be provided.

10.6.9.5 Scheme for Support to Professional Bodies/Societies

Recommendation:

The AICTE may develop an explicit, well-articulated policy laying down criteria for (i) identification of the nature of activities to be supported, (ii) choice of professional societies and (iii) quantum of support. A committee may be set up for the purpose.

10.7 Coordination with other Agencies *(Ref. Chapters 7 & 9)*

Section 10 (b) enjoins upon the AICTE to "coordinate the development of technical education at all levels".

For attaining the objectives of planning and coordinated development of technical education system, the AICTE has to coordinate with a number of agencies like UGC, DOS, DST, DAE, DRDO, Universities, State Governments, R&D Organizations recognized institutions outside the AICTE, and the MHRD.

10.7.1 University Grants Commission

10.7.1.1 Coordination in the matter of Deemed Universities

The UGC Act provides in Section 3 for the declaration of an institution of higher education as a Deemed University. As per the AICTE Act, the Council may, under Section 10(t), "advise the Commission for declaring any institution imparting technical education as a Deemed University". But, once a technical institution gets the status of a Deemed University, the AICTE ceases to have any real role in it.

Recommendations:

1. Deemed University status should be granted only to well-established institutions, which consistently get A grade in all their programmes.

2. For the purpose of declaration of a technical institution as a Deemed University, it should first have been set up with the approval of the AICTE and running courses duly approved by the AICTE, and all the programmes should have been accredited by NBA.

3. The over-all performance of the Deemed University and its campuses located at places other than headquarters shall be monitored for revalidation of deemed status every 5 years. A Joint committee of the UGC and the AICTE should be set up to monitor the functioning of the Deemed University and recommend whether or not to continue the special status.

4. At campuses in places other than the headquarters of the Deemed University, the proposal for starting various academic professional courses should have the prior approval of the AICTE.

5. The UGC should stipulate that the Board of Management of the Deemed University shall have a nominee of the AICTE.

6. Chairman AICTE should be represented on relevant UGC bodies just as the Chairman UGC is represented in the AICTE bodies

7. UGC-AICTE Forum should be set up to facilitate regular coordination. Such a forum should meet once or twice a year and deliberate on all major issues concerning technical education. Coordination is crucial in areas like pay scales, service conditions etc. to avoid anomalous situations.

10.7.2 Coordination with the Government

10.7.2.1 State Governments

The State Governments are responsible overall for the development of the State and would have a legitimate expectation that the creation of technical institutions and the supply of technical manpower from them would take into account and reflect the priorities of the State's developmental plans. Three agencies are involved in the approval process namely the AICTE, the concerned University and the State Government. The final decision is taken by the AICTE. The process involves a No-Objection Certificate by the State Government and agreement by the University to affiliate the institution in case of degree level institutions.

Recommendations:

1. The State should be closely involved in the planning and development of technical education in the state. The States and the AICTE should hold regular consultations for developing a broader understanding of key issues relating to technical education.

2. The State Government and the University should make a joint visit and decide on the NOC and affiliation, communicate it to the AICTE which will then send its expert team.

3. Annual visits by the AICTE committees for the purpose of renewal of approval should be replaced by visits ordinarily once every five years. In the interim the institution should supply information to the AICTE on the progress made. This information will be sent to the State Government for information, and comments if any, and also be put on the website.

10.7.2.2 Interface with the Government of India

The AICTE has been set up by the Government, which has the authority to give it directions on questions of policy and even to supersede the Council, if necessary.

Recommendations:

1. The AICTE should guard its autonomy vis-à-vis the Government lest its credibility as an independent statutory authority is compromised. Instructions from the Government on matters of policy under Section 20, the Act stipulates, are to be received in writing.

2. The AICTE should be allowed to take its own decisions regarding structure, staffing, new schemes etc. subject to the requirement of adhering to well established administrative and financial principles, control of its own systems and procedures and, overall annual audit by the Government.

3. Only those authorities and persons should attend the meetings of the AICTE who are members in their own right. However, where need arises for consultation with a non-member on a specific issue, the concerned person can be a special invitee to a particular meeting for that specific purpose.

10.7.2.3 Coordination with Ministry of Labour in respect of Industrial Training Institutes

Section 13(1) mandates the Council to establish, among others, an All India Board of Vocational Education. ITI's have their own non-statutory council, namely, NCVT. Coordination of the AICTE with NCVT is useful. Such coordination will complete the chain of technical education and give substance to the provision in Section 10(b) which states that the AICTE may "coordinate the development of technical education in the country at all levels".

Recommendation:

The All India Board of Vocational Education should, in conjunction with the Ministry of Labour, lay down the directions and modalities of coordination with the ITI system.

10.7.3 Universities

Keeping UG programmes on technical education of duration less than 4 years outside the purview of the AICTE does not seem logical.

Recommendations:

1. It is recommended that the UGC and the AICTE should jointly establish the criteria for deciding which programmes are part of the technical education system.

2. Even if certain programmes are retained with the UGC, as a special case, the AICTE should be associated with the programmes in such matters as norms, standards curriculum, syllabus, etc., UGC may be requested to prepare guidelines for this purpose in consultation with the AICTE and circulate the same to all the Universities.

3. Steps should be taken to ensure that the model syllabus published by the AICTE is consistent with the prescribed syllabus of the University, based on which the students are finally examined and evaluated.

10.7.4 Technical Universities

Recommendations:

1. Technical Universities should provide support to private colleges by organizing digital libraries, experimental facilities on the lines of Regional Sophisticated Instrumentation Centres, strategies for electronic teaching etc.

2. Technical Universities should organize research and development on educational technology and pedagogy and such innovations that will exploit recent advances in communication engineering.

3. The AICTE should continue to provide funding to universities and university affiliated technical institutions under its various schemes. Quantum of funding should be suitably enhanced. The financial needs of such institutions should be assessed by an inspection team of the UGC and the AICTE.

4. Accreditation of all technical institutions including those under the UGC should be the responsibility of the NBA.

10.7.5 Professional Societies

There are two types of discipline based professional societies, with which the AICTE has significant interaction. Issues connected with them are different so they need to be considered separately.

10.7.5.1 Statutory Councils

Recommendation:

In order to make the functioning free from conflicts, it is proposed that the disciplined-based Societies having statutory status should shed their primary responsibilities in the sphere of education and that they should focus only on issues relating to practice of the profession such as, registration, continuing professional development and code of conduct. The AICTE should, in such a division of functions, involve the statutory bodies in education, but statutory powers in education related matter should be only with the AICTE. In the same vein the responsibility of registration of professionals should be only with the professional societies.

10.7.5.2 Non-Statutory Societies

Recommendations:

1. The AICTE should evolve, jointly with the professional Societies, norms, criteria and other modalities for granting recognition to their qualifications as also for recommending the grant of a charter to them for promotion of such profession.

2. The output of such Societies has implications for manpower planning. In any exercise of supply estimation, whether conducted by NTMIS or any other agency, the contribution of such Societies should be incorporated.

10.7.5.3 Indian National Academy of Engineering:

Recommendations:

1. The scope of collaboration between the AICTE and the INAE should be expanded.

2. Regular financial support to the Academy should be provided to facilitate its functioning, and help meet the AICTE's developmental objectives.

10.7.5.4 Societies in the field of Sciences and Social Sciences *(Ref. Chapter 9)*

Educational programmes in Engineering tradionally had significant component of science and social science courses. This has reduced of late in the effort to include more courses on engineering disciplines. This adversely affects the quality of engineers who do not get a sound grounding in sciences and little or no exposure to societal issues.

Recommendations:

1. The AICTE should interact with bodies engaged in the promotion of science and social sciences, and constantly maintain a dialogue at the level of committees for reviewing, assessing and modifying the inputs of sciences and social sciences to the educational preparation of engineers.

2. Minimum norms for familiarity with social sciences and societal problems should be laid down.

10.7.6 R&D Organizations

Recommendations:

1. Each Scientific and Technical Department, and R & D agencies of Government should allocate at least 1% of its budget for supporting PG education and research.

2. Facilities should be made available to 3rd and 4th year students of engineering to be short-term apprentices for training in R& D Organizations.

3. The AICTE should set up a Standing Committee for coordinating linkages with the R&D system.

10.7.7 Recognized Institutions outside AICTE

A number of institutions in the field of technical education are outside the ambit of the AICTE. They include IITs, IIMs and Deemed Universities including NITs. All such institutions are of high quality and reputation.

Recommendations:

1. The involvement of these institutions with the AICTE will be mutually beneficial. It is recommended that an AICTE-IIT Consultation Forum be set up which meets regularly to discuss development of technical education and work towards a synergistic approach.

2. Similar fora should be created by the AICTE with other institutional systems, like the IIMs, NITs and the TTTIs.

10.7.8 Coordination in respect of Non-Formal Programmes

At present there is no system of academic regulation or accreditation of non-formal programmes run by organizations, commercial & corporate. Apart from other considerations, non-formal programmes have a significant impact on the supply of trained manpower.

Recommendations:

1. It is recommended that a Standing Committee be set up to continue monitoring the developments in the non-formal sector and evolve the position and programmes the AICTE should take up in the matter.

2. The AICTE should consider taking up monitoring of quality of selected programmes.

3. The AICTE should consider modifying the coverage of NTMIS so as to include the products of non-formal programmes in the estimation of supply and monitoring of unemployment.

10.7.9 Coordination with different agencies in respect of Entrance Examinations

Admission to many of the programmes approved by the AICTE is conducted on the basis of entrance examinations conducted by various examining bodies. The AICTE should examine how to move the system towards one nationally recognized system of examination. Meanwhile, it is proposed that the AICTE may coordinate the working of examining agencies in the following directions.

Recommendations:

1. There should be coordination of dates and contents of various examinations for the convenience of candidates.

2. The Boards should be persuaded to have some uniformity in the standards of examination and evaluation.

10.8 Technical Education in the Context of Globalization *(Ref. Chapters 8 & 9)*

In this era of globalization, the AICTE has the responsibility of empowering the nation to cope with global competition and to utilize the emerging opportunities.

Recommendations:

1. The AICTE should have a Cell to keep track of changes introduced by agencies like the WTO, issues like Trade Related Agreements on Intellectual Properties (TRIPS) and initiate appropriate educational steps to deal with such changes.

2. The AICTE should take suitable steps to help the establishment of high quality institutions in other countries.

3. Specific steps should be taken to prevent unworthy institutions from other countries from misleading students in India.

4. Checks should be set up to ensure that foreign institutions do not offer substandard courses either directly or in collaboration with Indian institutions.

5. Appropriate syllabi and courses should be developed to enable Indian technical personnel to utilize employment opportunities abroad.

The AICTE must ensure that these regulations are enforced strictly.