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STAFF APPRAISAL REPORT

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

MARCH 8, 1991

Asia Country Department IV (India)
Population, Human Resources, Urban and Water Operations Division

CURRENCY EQUIVALENTS

(As of January 1991)

Currency Unit = Rupee
Rupee 19.43 = US$ 1.00
Rupee 1.00 = US$ 0.051

METRIC EQUIVALENTS

1 Meter (m) = 3.28 Feet (ft)
1 Kilometer (km) = 0.62 Miles

FISCAL YEAR

April 1 - March 31

ABBREVIATIONS

AICTE	-	All India Council for Technical Education
BTE	-	Bureau of Technical Education
DEA	-	Department of Economic Affairs, Ministry of Finance
DGS&D	-	Directorate General of Supplies and Disposals
DOE	-	Department of Education, Ministry of Human Resources Development
DTE	-	Directorate of Technical Education
DPR	-	Detailed Project Reports
EFC	-	Expenditure and Finance Committee, Ministry of Finance
EDCIL	-	Education Consultants India Ltd.
GOI	-	Government of India
IAMR	-	Institute for Applied Manpower Research
IIT	-	Indian Institute of Technology
ITI	-	Industrial Training Institute
MHRD	-	Ministry of Human Resources Development
NBA	-	National Board of Accreditation
NTMIS	-	National Technical Manpower Information System
NPE	-	National Policy on Education (1986)
NPIU	-	National Project Implementation Unit
PFU	-	Project Facilitation Unit
TTTI	-	Technical Teacher Training Institute
SPIU	-	State Project Implementation Unit

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This report is based on the findings of an Appraisal mission from November 28-December 14, 1990. Mission members were Mr. R. Cambridge (Principal Economist, Team Leader), E Sigl (Technical Educator), Ms. A. Nazareth (Educational Planner), and E. Dib (Architect, Consultant). Ms. M. Chatterji, (Secretary NDO) and Ms. S. Pak assisted in preparing the Report. The processing of the project was supervised by Mr. R. Skolnik, Chief, Population, Human Resources, Urban and Water Operations Division (AS4PW) and Mr. H. Vergin, Director of the India Country Department.

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DIAGRAMS/CHARTS

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Basic Data /a

General

Population (million) 1988	848
Annual Growth (%)	2.2
Urban Population (% of total)	25
GNP per capita (US$)	270
Population below poverty line (%) (1983)	37

Employment in the Organized Sectors (1986)	Million	Percent
Agriculture	1.4	6
Industrial Sectors /b	12.4	49
Service Sectors	11.3	45

Labor Force Participation Rate (1986)	Male	Female	Total
Participation rates (%)	55	21	39

Labor Force by Education Level (%)	Primary & Below	Secondary	Higher
	80	15	5

Number of Vocational Training and Technical Education Institutions, Enrollments and Output (1986-87)

Type	No. of Institutions	Enrollments	Annual Output
Industrial Trg. Institutes (ITI) (Government)	852	228,278	80,350
ITI (Private)	1,035	98,831	25,327
Advanced Voc.Trg. Schools	22	10,000	10,000
Secondary Voc. Schools	1,500	72,000	26,000
Polytechnics (AICTE approved)	467	194,000	68,000
State Eng. Colleges (SEC)	272	100,000	25,000
Regional Eng. Colleges (REC)	17	21,000	5,500
Indian Inst. of Technology (IIT)	5	4,000	1,300
Apprenticeship Training	139(trades)	131,486	49,500

Ministry of Human Resource Development:Budget Allocations (US$ million)

Department of Education	Plan	Non-plan
Budget Estimates (1989-90 Revised)	463.5	382.0
Budget Estimates (1990-91)	510.7	441.1

/a Sources: Ministry of Manpower & Ministry of Human Resources Development (unless shown otherwise).

/b Includes mining and quarrying, manufacturing, construction, public utilities, and transport and communications. Includes employment in establishments of 10 workers or more.

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CREDIT AND PROJECT SUMMARY

Borrower:	India, acting by its President
Beneficiaries:	Governments of Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu, and West Bengal and the Union Territory of Delhi
Amount:	SDR 213.5 million (US$307.1 million equivalent)
Terms:	Standard, with 35 years maturity
Onlending Terms:	Government of India (GOI) to Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu and West Bengal and the Union Territory of Delhi: in accordance with standard arrangements for development assistance to States and Union Territories for the development of education projects on terms and conditions applicable at the time.
Description:	The goal of the project is to support the National Policy on Education, and more specifically, the Ten-Year Technician Education Investment Program (1990-99). The project is a second phase of IDA's commitment to support the national Polytechnic System and the Ten-Year Investment Program which seeks its modernization and the reform of the policies which constrain the system's flexibility to respond to the changing needs of industry and society. The project would be identical to the First Technician Education Project (Ln 3195-IN:Cr 2130-IN) and would have the same major objectives: Capacity Expansion which would be achieved by expanding and diversifying programs in about 240 new and existing institutions, so that they can undertake with flexibility, courses in new and emerging technologies, conventional and advanced technician engineering, and continuing education diploma courses. Special attention would also be given to expanding and improving training opportunities for women, rural populations and the informal sector by establishing new Women's Residential Polytechnics, upgrading Coeducational Polytechnics to create more opportunities for women, and expanding the number of Community Polytechnics. Quality Improvement would be achieved through modernizing the equipment and facilities of

Polytechnics, expanding and improving the quality of training of Polytechnic teachers and undertaking curriculum development activities. Efficiency Improvement would result from strengthening State Directorates and Boards of Technical Education, granting academic autonomy to selected Polytechnics, undertaking Industry-Institute Interaction programs in each Polytechnic, encouraging internal revenue generation in Polytechnics and establishing equipment and facility maintenance systems.

Benefits and Risks

The proposed project would provide India's industrial sector with technicians of suitable quality in the areas of civil, mechanical, and electrical engineering, as well as in computer and electronics technology and in other required new and emerging areas. The emphasis to be given to continuing education programs recognizes that the system must also serve the rural and informal sectors and update the current stock of employed technicians. Expanded programs for women also means that serious efforts are underway to more fully integrate women into modern sector wage employment. Ultimately, the major benefit of the project beyond the numbers of students trained, is that it would continue the policy reforms that were initiated by Government and started under the first Technician Education project, and support as well, institutional development processes such as the introduction of flexibility in student entrance and graduation requirements, career development for teachers, curriculum development to develop new courses and training techniques and the institutionalization of maintenance, internal revenue generation and career counselling and employment programs. These changes would facilitate the ability of the system to respond to a rapidly changing environment, and would contribute to the technology transfer objective which is a key aspect of development. The major risk facing the project concerns the ability of individual States to undertake integrated programs of both policy reform and physical development. This risk would be mitigated by the Annual Action Plans to be prepared by each participating State, the Detailed Project Reports to be prepared by each Polytechnic, by enhancing and

strengthening the Directorates and Boards of Technical Education in each of the implementing States, the support to be provided to them by the Technical Teacher Training Institutes (TTTIs), and the key role to be played by the strengthened central institutions, i.e., the Bureau of Technical Education (BTE), the National Project Directorate and the National Project Implementation Unit (NPIU).

Estimated Costs:

Components	Local	Foreign	Total
		--US$ million--	
Capacity Expansion	121.62	35.40	157.02
Quality Improvement	99.33	38.82	138.15
Efficiency Improvement	25.30	4.30	29.60
Total Base Cost	246.25	78.52	324.77
Contingencies	19.15	18.18	37.33
Total Project Cost*	265.40	96.70	362.10

* including taxes and duties of US$10.7 million.

Financing Plan:

States	29.80	-	29.80
GOI	25.20	-	25.20
IDA	210.40	96.70	307.10
Total	265.40	96.70	362.10

Estimated Disbursements:

FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99
13.3	34.3	60.4	61.7	46.6	36.7	33.2	15.9
13.3	52.6	113.0	174.7	221.3	258.0	291.2	307.1

Economic Rate of Return: Not Applicable.

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I. TECHNICIAN EDUCATION IN INDIA

A. Introduction

1.01 India is in the process of modernizing its industrial sector. The key aspects of these developments include the importation of new technologies for the design and production of durable goods, the reorganization of industrial management and the restructuring of public enterprises. To achieve this, a number of steps have been taken to reform the overall policy regime and make it more conducive to the promotion of competition, modernization, and cost efficiency, with an emphasis on easing entry or expansion of incumbent firms, and the recognition of efficient scales of production. The shortage of technically educated people and people with high quality industrial skills is a major impediment to India's industrial development. The technical education system has grown enormously in the past few decades. It has also diversified extensively. Yet, it faces today a number of important problems that limit its potential contribution to increased industrialization. First, significant segments of the rural population and women have only limited access to the system. Second, the quality and efficiency of the system are low. There is a shortage of qualified teachers, training materials are lacking, equipment is obsolete, and courses are not as relevant to modern sector industry as needed. As a result, student repetition is high and the system is not producing educated people of the type, quality or quantity needed.

1.02 The Government of India (GOI) is placing increasing emphasis on human resource development and the alleviation of poverty. Substantial progress has been achieved as indicated in the rise of the literacy rate from 17% in 1951 to 36% in 1981, and for women it rose from 8% to 25% in the same period. In spite of these achievements, the number of illiterates grew from about 200 million to 400 million over the same period and for the age group 10-14, the literacy rate rose only from 23% in 1951 to 25% in 1981. In comparison with other developing countries in the region, India's social services are still less effective and extensive. The adult literacy rate, for example is well below Malaysia (73%) and China (76%). In addition, the primary school enrollment ratio is only 79% in India compared to the attainment of close to Universal Primary Education for the appropriate age group in Malaysia, China, Korea and Thailand. It is important to note however, that within India, there are considerable variations among regions.

1.03 In 1986, the GOI formulated a National Policy on Education (NPE) which includes a Ten-Year Technician Education Investment Program (para 2.06) for the upgrading of the technician education and training system. That program would introduce new diploma programs with the emphasis on new and emerging technologies, expand programs for women and rural populations as well as continuing education programs aimed at upgrading already employed technicians. It would also improve the quality of these programs by strengthening teacher training programs, curriculum development, examination and student assessment systems, and modernizing the workshops, laboratories and classrooms of the Polytechnics. Finally, it would improve the efficiency of the technician education system by strengthening the All India Council for Technical Education (AICTE), the four Technical Teacher Training Institutes (TTTIs), the Bureau of Technical Education (BTE) in the Department of Education (DOE), the State Boards and Directorates of Technical Education, granting academic autonomy to selected

Polytechnics, and further strengthening the National Technical Manpower Information System (NTMIS) and the National Board of Accreditation (NBA).

1.04 The proposed project would support the Ten-Year Technician Education Investment Program in eight States: Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu, West Bengal and in the Union Territory of New Delhi; and would be the second phase of the IDA's commitment to support the modernization of the national Polytechnic system as well as the reform of policies which constrain the system's ability to respond flexibly to the changing needs of industry and society. It would be identical in content to the first Technician Education Project (Ln 3195-IN/Cr 2130-IN) of May 1990 which covered eight States i.e. Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh. Its special features would be the same as the first project and include (a) expanding the opportunities for women in modern sector training and employment; (b) increasing linkages between Polytechnics and industry; (c) recognizing that maintenance programs are concomitant with investments in new equipment and facilities; (d) improving internal revenue generation in the Polytechnic system; (e) introducing flexibility in entrance and curriculum requirements into the existing rigid three-year diploma programs; and (g) the systematic training of teachers and introduction of a career development system. The two Technician Education projects would cover about 61% of the Polytechnics in the national system, but almost all of the public sector (AICTE-approved) Polytechnics. The background to the project and related details are described below.

B. Organization of Technical Education

1.05 Industrial workers in India are developed through public and privately financed education and training institutions, apprenticeship-type training, and in-plant training. The publicly financed technical education system operates at three levels and this is shown in **Charts 1 and 2**. At the apex of the system, the five Indian Institutes of Technology (IITs) offer undergraduate and graduate programs in engineering with a total annual admission of about 1,300 students. At the next tier, there are 17 Regional Engineering Colleges (RECs) which admit about 5,500 students each year. These institutions are jointly financed by the Central Government and the States. There are also 272 State Engineering Colleges (SECs) with an intake capacity of about 59,400 students. Of these, 97 are affiliated to local universities and financial assistance is provided by State Governments. There are also 167 private Colleges but about 25% of them receive assistance from the States and allocate about 80% of their seats to candidates nominated by the States. Most of these institutions also charge capitation fees ranging from Rs.50,000 to Rs.100,000 per year. At the next level, there are 767 Polytechnics which provide three-year diploma courses in civil, mechanical and electrical engineering. Of these, 367 are government approved and financed with an intake capacity of about 52,000 students. Another 100 private Polytechnics receive grants from the States, follow the curricula prescribed by the State Boards of Technical Education, and have a total annual intake capacity of about 15,000. The remaining 300 are self-run private Polytechnics. Polytechnics in the eight project States and New Delhi showing enrollments (1988/89) are shown in **Annex 1**. In the southern States, there are about 300 self-financed Polytechnics with an estimated intake of about 48,000. These institutions are not approved by the Government, and they charge capitation fees which range from Rs. 5,000 to Rs. 40,000 per student. However, the All India Council for Technical Education (AICTE) has established a number of guidelines as outlined in **Annex 2** by which these private Polytechnics will be able to receive official recognition, Center and State financial assistance, and become an integral and important part of the

national Polytechnic system. Instructors for the Polytechnics are trained at four centrally financed Technical Teachers Training Institutes (TTTIs). The TTTIs also provide assistance to the States in the areas of curriculum development and implementation, distance education and the introduction of new courses and methodologies of training. Certificate-level craftsman trade courses are offered to about 325,000 students annually through 1,887 Industrial Training Institutes (ITIs). Only 652 of these institutions are publicly financed and operated by the Directorate General of Employment and Training (DGET) in the Ministry of Labor. The other ITIs are private institutions. Lastly, there are about 1,500 Vocational Schools operated by the Department of Education (DOE), which offer certificate courses to about 72,000 students each year. A fuller description of the Technical Education System is outlined in **Annex 3**.

C. Management and Administration of Technical Education

1.06 The planning, promotion, and control of technical education rests with the All Indian Council for Technical Education (AICTE) and the Bureau of Technical Education (BTE) in the Department of Education (DOE), Ministry of Human Resources Development (MHRD) at the national level. The system is operated at the state level by the Directorates and State Boards of Technical Education. The AICTE is the apex body providing leadership in the planning, promotion and regulation of technical education in the country. It has four All India Boards of Technical Studies for: (a) Technician Education; (b) Undergraduate Studies; (c) Post-Graduate Engineering Studies and Research; and (d) Management Studies. The Bureau of Technical Education acts as the administrative and governmental arm of AICTE and its various Boards, while at the same time, has powers relating to the processing, implementation, monitoring, control and evaluation of programs and projects in Central institutions, and centrally-sponsored and Plan schemes. The National Technical Manpower Information System (NTMIS) with the lead center at the Institute of Applied Manpower Research (IAMR) and 21 nodal centers in the States furnishes relevant manpower information for technical education planning. In the States, the Directorates and Boards of Technical Education are responsible for the planning, management, administration and funding of technical education.

D. Problems and Issues in Technician Education

1.07 Despite the impressive growth and diversification which the technical education system has undergone in the past few decades, it is still plagued by a variety of problems which are directly related to and affect its capacity to respond to the changing needs in the society, the quality of graduates which it produces, and the efficiency with which it is operated. Since this project follows immediately the first Technician Education project of May 1990, the analysis of the problems and issues in technician education were discussed in detail in the Staff Appraisal Report No. 8384-IN dated April 3, 1990. These are outlined in detail in **Annex 4**, and summarized in the paragraphs below.

Capacity

1.08 As the industrial modernization process increases in momentum in India, there is a need for two distinct types of technical personnel at the diploma level: these are the Technician and the Technician-Engineer. At present, the Polytechnics are not capable of fully responding to the emerging demand for a range of diversified and specialized occupations. Another problem is related to the rigidity of the structure of the courses where students who enter from varied educational and training levels pursue the same three-year program structure with no scope for rapid advancement or mid-course changes. A flexible Multi-Point

Unit and Credit system is in place in Gujarat and is being gradually introduced in the States participating in the First Technician Education Project. While the GOI is committed to increasing opportunities for women, scheduled castes/tribes, and rural populations, only a small percentage of Polytechnics address the needs of these disadvantaged groups through provision for separate residential accommodations for women, specialized short courses through Community Polytechnics and rural outreach projects.

Quality

2.09 One of the major reasons for the poor quality of training at the Polytechnics is a teaching force which lacks adequate pedagogical training and industrial experience. The TTTIs are being upgraded to Regional Resource Centers under the first Technician Education Project to enable them to offer courses to the huge backlog of untrained teachers. These institutions would provide the same services to teachers in the States in this project. There is a 30% teacher vacancy rate at the Polytechnics and while many of these posts are filled with ad hoc appointments, the system's quality is ultimately affected because of constant turn over. The quality of the system is also affected by the obsolescence and inadequacy of equipment and instructional facilities.

Efficiency

2.10 At present, systematic planning and coherent decision making is hampered by the lack of relevant, meaningful and reliable information about the internal and external efficiency of the system. There is an oversupply of some engineering specialties which results in under-or unemployment of graduates while other emerging disciplines have ample job opportunities. This problem will be partly addressed by the GOI's strengthening of the National Technical Manpower Information System (NTMIS), and by establishing Industry-Institute Interaction programs in the Polytechnic in the first and second project States. With regard to internal efficiency, the major problems are the high repetition rates and the outdated examination system.

II. GOVERNMENT POLICIES, PLANS AND PROGRAMS IN TECHNICAL EDUCATION

A. National Policy On Education

2.01 After considerable national consultation and debate, the Government enacted the National Policy on Education of 1986 (NPE), which gave a policy framework to the programs enacted for development under the Seventh Five-Year Plan. The Five-Year Plan and NPE were clear in recognizing the key issues affecting the sector and highlighted three priorities among its many goals. These are: (a) universal primary education; (b) universal literacy for youth and adults; and (c) the development of specialized manpower for the industrial sector. Several new programs were launched to meet these objectives, and among these is "Operation Blackboard," which is designed to provide essential facilities and learning materials to primary schools. To meet skilled worker needs, two programs have been launched. The first essentially upgrades Industrial Training Institutions (ITIs) and the second calls for the introduction of a vocational stream at the upper secondary level.

2.02 In teacher education, District Institutes of Education and Training (DIETs) are to be established with the capability of organizing pre-and in-service courses for primary school teachers and instructors in non-formal/adult education programs. Selected secondary teacher training colleges will also be

upgraded and arrangements made to establish better linkages between teacher education and training institutions and Departments of Education in universities. At the higher education level, the emphasis is on consolidation, with only selective expansion in the areas of science and technology.

2.03 In the technical education subsector, a number of new thrusts and directions are called for. The most important of these are to: (a) increase facilities for computer education; (b) highlight entrepreneurship as an avenue for engineering professionals; (c) encourage the participation of users in the curriculum development process; (d) restructure programs to provide flexibility by adopting credit-based courses and making provisions for multi-point entry; (e) expand programs and facilities for women and the handicapped; and (f) undertake continuing education on a large scale, including distance learning programs of both the formal and non-formal nature.

2.04 Since the Seventh Five-Year Plan and NPE have been launched, the Government has initiated and completed a number of actions. First, the Parliament has enacted legislation to establish the AICTE and has granted it the necessary statutory powers for the development and regulation of technical education. It has already started the process for creating a National Board of Accreditation (NBA), and has formulated the procedures it would adopt to grant accreditation to technical education institutions after they have been sanctioned and recognized by the AICTE. The AICTE is also taking the necessary steps for granting academic autonomy to a selected number of Polytechnics. The National Technical Manpower Information System (NTMIS) has been established. The Bureau of Technical Education has already instituted an IIT-REC network scheme for the development of laboratories as well as faculty exchanges. Some interaction between the IITs and the Confederation of Engineering Industries (CEI) already exists. The AICTE has made recommendations regarding faculty recruitment procedures, qualifications for different cadres, pay scales and in-service training. Finally, a Performance Appraisal System has been developed and is awaiting AICTE approval.

B. The Eighth Five-Year Plan (1990-94)

2.05 The Eighth Five-Year Plan has not yet been approved by the Government. All indications are that after the first year of the Plan period (1990-91) the major thrusts in technical education will continue as under the Seventh Five-Year Plan, with more emphasis on entrepreneurship, support for technology changes, and training for job-creation and employment. There is also likely to be more attention given to finding ways for the system to self-finance and gradually reduce the burden of operational costs on public finances.

C. The Ten-Year Investment Program (1990-99)

2.06 In early 1988, at the request of the Department of Education (DOE), the TTTIs developed a Ten-Year Technician Education Investment Program for the 467 Government approved Polytechnics and the TTTIs to cover the Eighth (1990-94) and Ninth (1995-99) Five-Year Plan periods. The Investment Program broken down by the various sub-projects and estimated costs by objective is shown in **Annex 5**. The total estimated cost of the Investment Program is US$1.86 billion. Each individual sub-project has been reviewed and approved in principle by the DOE. However, financing of the program depends on the contributions of individual

States and the level of Central Government funding under the Annual Development Plans.

D. Financing of Technician Education

2.07 Financing of technical education is shared by both the Center and State Governments (Annex 3, Paras 8-12). The States are fully responsible for the public Polytechnics, and also finance privately-managed Government-approved Polytechnics at levels varying from 75% to 95% of recurring expenditure. However, the State Plans themselves are funded 50% by the States and 50% by the Central Government. All non-plan expenditures are met by the States and Union Territories. About 20% of the students who enroll in Polytechnics receive stipends and fellowships.

2.08 The average annual expenditure by a Polytechnic student on tuition, boarding, lodging and other training costs is about Rs 300. This represents less than about 10% of the annual operational cost per student which is about Rs. 4,500. The present fee structure at Polytechnics in project States is shown in **Annex 6**. The issue of cost recovery for any level of general pre-employment education is politically very sensitive in India and as a result the fee structure at Polytechnics and other post-secondary (pre-service) institutions and programs has remained intact for more than ten years. Because of this sensitivity, agitation by students, and a constituency in India which argues that equity can be maximized through increased access and subsidies to the truly disadvantaged, attempts at raising tuition fees and reducing subsidies have not met with much success. However, under the first Technician Project, the participating States have committed to expanding internal revenue generation activities, among which changes in the fee structures can be undertaken.

2.09 The Central Government finances technical education under two major areas: Central Institutions and Central Intervention Schemes. Central assistance to Polytechnics is provided in two ways. First, funds can be provided for Approved Schemes related to national policy, such as Modernization/Removal of Obsolescence from Polytechnics, and second, for new programs and institutions. The procedures for funding through Central Assistance Schemes involves vetting and approval by the BTE, the Regional Committee of the AICTE, the TTTI and the State BTE.

E. External Financing of Education

2.10 Several donors are involved in the education and training sector, but the scale of their operations is small. UNICEF supports projects in basic education, while USAID assists project-related training (PRT) in agriculture, managerial and technical areas of public and private sector management, and science and technology. The ODA, with the British Council implementing, has a pilot project of primary education improvement in Andhra Pradesh. The UNDP, with the ILO as executing agency, has supported vocational training through the improvement of several ITIs and the introduction of the Advanced Vocational Training Program. More recently, the ILO has established facilities for numerically-controlled and computer-controlled (CNC) training at the Advanced Vocational Training Institutes (ATIs) in Bombay and Kanpur. The Federal Republic of Germany is supporting a limited number of Polytechnics in Madhya Pradesh while Italy is supporting a Vocational Training Center in New Delhi. In the early stages of their development, the ITIs, RECs and TTTIs received assistance from a

number of bilateral sources and the UNDP. The ODA and the Netherlands have assisted the TTTIs. Canada is also providing assistance to the TTTI located in Madras and to a number of colleges in Tamil Nadu. The International Development Research Center (IDRC) is undertaking a long-term study of the relationship between vocational/technical education and employment concentrating on ITIs; the utility of technical training received by women, and preparing guidelines for improving existing programs at ITIs. In the early 1970s, the UNDP funded the Curriculum Development in Technician Education project. Under this project about 301.5 staff-months of fellowship training, 201 staff-months of technical assistance and US$2.1 million worth of equipment was provided to the TTTIs to establish a National Testing Service and to undertake technician education research.

F. IDA Role and Sector Lending Strategy

2.11 **Previous Experience**: IDA has supported three projects in the sector. The first was a Credit of US$12.0 million which was approved in 1973 to assist agricultural education and research at Assam Agricultural University, Rajendra Agricultural University in Bihar, and the Institute of Agricultural Research in New Delhi. The project was closed in 1982 and a Project Performance Audit Report (PPAR)(No. 5668 of May 23, 1985) issued, which noted that most of the objectives of the project had been achieved. The project suffered delays in implementation because of civil unrest in Assam, which meant that Bank staff could not visit the State for three or more years, and the fact that IDA's experience in university development projects was limited at the time this project was approved. Typically, this would have been a two-phased operation with emphasis given to detailed campus planning, academic/program development and staff training in a first operation. A second operation would have concentrated on construction and operation. The second project with IDA and Bank financing of US$280.0 million (US$250.0 million, IDA; US$30.0 million, Bank) was approved by the Board in May 1989. It is a Vocational Training project and concentrates on the expansion and qualitative improvement of pre- and in-service training of skilled/semi-skilled workers at Industrial Training Institutes (ITIs). Project implementation has been satisfactory to date. The third project with IDA and Bank financing of US$260.0 million (US$235.0 million, IDA; US$25.0 million Bank) was approved by the Board in May 1990. It is the first Technician Education Project and covers about 230 Polytechnics. The main objectives of the project are capacity expansion and quality and efficiency improvements. Although these latter two projects have only recently started, substantial progress in establishing management and implementation systems, procurement of equipment, development of new courses and civil construction are already evident. The IDA and the Bank have also supported training components as well as free-standing training projects in other sectors such as Forestry, Irrigation/Water Management, the Cement and Electronics Industries and Agricultural Extension.

2.12 **Rationale for IDA Involvement**: Because of inefficiencies, technological weaknesses, inappropriate pricing policies, and inadequate standards of quality and reliability in the industrial sector, IDA endorses a lending program which concentrates on the industrial sector as the key input to a broader strategy aimed at supporting economy-wide improvements in the efficiency of domestic resource mobilization, allocation and use. IDA also believes that investments in the social sectors including education and training, health, population, nutrition, water and sanitation can directly support industrial development through improved productivity of workers. In addition to alleviating the more

degrading aspects of poverty, investments in education and training, including retraining, can provide a means of increasing skills which would be required for the introduction of more technology, and the more skill-intensive elements in industry and agriculture.

2.13 GOI's Ten-Year Technician Education Investment Program will lead to adjustments in technician education policies, bring about institutional changes, and introduce new technologies in training and industry. IDA assistance would therefore continue to support policy reform, institutional development and technology dissemination. IDA's involvement with the technician education sub-sector also provides an avenue to pursue the dialogue on industrial training on a broader scale and compliments the Vocational Training and first Technician Education Projects. The skilled workers who are trained in the ITIs and who ultimately find employment in the industrial and modern sectors, will work closely with the technicians who are trained in the Polytechnics. Finally, IDA involvement in technician education would provide a forum for a discussion not only of skills development generally, but also the need for the system to improve its revenue generation and the role the private sector can play in organizing in-plant training and the other non-formal ways of training which can be directed to women, the rural and informal sectors. The proposed project takes into account the lessons learned from the first education project since special attention has been given to the detailed physical and academic planning for new Polytechnics. It also builds on the early experiences of implementation of the Vocational Training and first Technician Education project.

III. THE PROJECT

A. Goals and Objectives

3.01 **Goals**. The goals of the proposed project are to support the National Policy on Education (NPE) (Paras. 2.01 - 2.04). More specifically, the proposed project is the second phase of IDA's commitment to support the national Polytechnic system. It follows the first Technician Education project and supports the Ten-Year Technician Education Investment Program which is formulated in the context of the NPE.

3.02 **Objectives**. In order to achieve the above goals, the proposed project would have three objectives. These are to: (a) expand the capacity of selected Polytechnics; (b) improve the quality of Polytechnic programs; and (c) increase the efficiency of the management and operation of the Polytechnic system at the Center and in the States.

3.03 The capacity expansion objective would be achieved by: (a) introducing programs in new and emerging technologies at existing Polytechnics; (b) developing a limited number of new Polytechnics; (c) establishing programs of Continuing Education; and (d) expanding programs aimed at Women and the Rural and Informal Sectors.

3.04 The quality improvement objective would be achieved by: (a) strengthening teacher education and training programs at State-level Staff Development Centers; (b) establishing curriculum development and research programs; (c) modernizing laboratories and workshops and replacing obsolescent equipment at the Polytechnics; (d) instituting maintenance programs and improving internal revenue generation; and (e) initiating faculty development programs for Polytechnic teachers.

3.05 The efficiency improvement objective would be achieved by: (a) strengthening the administration and management of the State Directorates and Boards of Technical Education; (b) granting autonomy to a selected number of Polytechnics; and (c) establishing Industry-Institute interaction programs at Polytechnics.

Table 3.1 Objectives, Investments and Desired Outcomes

OBJECTIVES	INVESTMENTS	DESIRED OUTCOMES
CAPACITY EXPANSION through		
o Introducing Programs in New Technologies	Curriculum development, equipping workshops and training new and existing teachers to develop and introduce 89 new Technology Diploma and post diploma courses	Training about 21,460 Polytechnic graduates in new technology areas.
o Developing New Coeducational Polytecnnics	Construction, furnishing, equipping and staffing of 9 New Polytechnics.	Creation of an additional 3,465 places.
o Developing Continuing Education Programs	Establishing through provision of civil works equipment, books and materials, 40 Continuing Education Departments and Centers.	Training about 24,520 students through these programs over the project period.
o Expanding the Community Polytechnic System	Construction, furnishing, equipping and staffing 54 existing Polytechnics so that they would have the capacity to function as Community Polytechnics.	Training about 12,520 students in non-formal skills programs appropriate for the informal and rural sectors
o Expanding Training Opportunities for Women	Construction, furnishing, equipping and staffing 9 New Residential Polytechnics for women as well as special Wings at 6 Co-educational Polytechnic. Also, establishment of special Cells in each Polytechnic to ensure employment of female graduates.	Creation of an additional 4,640 places annually for women in Polytechnics.
QUALITY IMPROVEMENT through:		
o Improving and Expanding Teacher Training	Construction, furnishing, equipping and staffing 52 Staff Development Cells/ Centers in States/Polytechnics.	Developing a system of continuous on-the-job and in-service trainig for Polytechnic Teachers. Training about 2,100 teachers over the project period.
o Improving the Curriculum Development Process	Construction, furnishing, equipping and staffing of 15 Curriculum Development Centers in State Boards of Education.	Developing a system for the continous up-grading and renewal of all curriculum.
o Modernization of Equipment and Facilities	Construction, furnishing and equipping about 600 workshops, laboratories, computer centers and Learning Resources Cells/Centers at about 230 Polytechnics.	Facilities and staff to offer training of relevance to modern-sector industry.
o Developing Maintenance Capacity	Construction, furnishing and equipping 208 Maintenance Cells at State and Polytechnic levels.	Creation of a system for the systematic maintenance of facilities and equipment at the Polytechnics
EFFICIENCY IMPROVEMENT through		
o Strengthening Management and Administration	Appointment and training of about 300 additional staff and training at the State Directorates and Boards of Technical Education.	State Directorates and Boards with capacity to manage effectively a large and diversified Polytechnic system.
o Expanding Autonomy	Providing support to about 26 Polytechnics to achieve academic and financial autonomy. Construction of facilities and equipment for conducting examinations.	Increased diversity in Polytechnic System and flexibility of institutions to respond to demands from industry.
o Forging Stronger Linkages with Industry	Furniture, equipment, staff and training for the establishment of about 240 Industry-Institute Cells at State and Polytechnic levels	A larger number of students and faculty would have industrial experience. Industry would be more intimately linked to the curriculum development and training processes. Students would be more acceptable to industry as employees. industry.

B. Scope

3.06 Eight States: Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu and West Bengal and the Union Territory of New Delhi have been selected to participate in the proposed project. They were chosen on the basis of a number of criteria developed by GOI and agreed by IDA. These criteria are outlined in **Annex 7**. Basic information on the Polytechnic System in these States and Delhi is shown in Annex 1. The project has been designed with flexibility to facilitate implementation and the inclusion of additional activities and Union Territories agreed to under the Ten-Year Technician Education Investment Program (Para. 2.06) as and when the availability of local resources and implementation warrant. The detailed appraised project components by State are shown in tabular form in **Annex 8**.

C. Capacity Expansion (Proposed Outlay US$157.02 million) 1/

3.07 In response to the problems generated by rigidity of course/program structure and conventional programs (Annex 4 Paras 2 and 3) a variety of activities would be undertaken including: (a) expanding the offerings of new Diploma courses in emerging and specialized areas as well as Advanced (Post-Diploma) Technician courses at existing Polytechnics; (b) establishing new Polytechnics, (c) expanding Continuing Education; and (d) expanding Women's Technician Education opportunities and training for the Rural and Informal sectors.

3.08 Programs in New Technologies. About 90 new technology Diploma and Post Diploma courses would be introduced in about 240 of the existing Polytechnics. A list of the specific new programs and courses to be offered is summarized in **Annex 9**. The intake for each program would be about 30 students and would cater to the needs of industry. Draft course outlines for each new technology program, including how environmental awareness and conservation would be specifically addressed and made part of these courses are under development as part of the first Technician Education project. At the end of the project, a total of about 21,460 technicians will have graduated in emerging/specialized technologies and in other diversified areas both at the diploma and advanced technician levels. Because the costs of introducing new programs into existing Polytechnics would be substantial, and because the internal revenue generation of the Polytechnics are minimal, during negotiations, the States and Delhi provided assurances that by December 31, 1991, they shall review the current practices and levels of internal revenue generation for their respective Polytechnics and develop plans to increase internal revenue generation through various ways and means.

3.09 New Coeducational Polytechnics. Over the project period, all formerly male Polytechnics would be gradually made coeducational Polytechnics. Of the 240 Polytechnics to be assisted, only 9 new Coeducational Polytechnics would be developed. The remainder would receive assistance to modernize their equipment and facilities (para 3.18). The new Polytechnics would offer programs which would lead to Advanced Vocational Certificates, Vocational Diplomas, Diplomas and Advanced Technician Diplomas/Technician Degrees. Wherever feasible, programs

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1/ This and other references to proposed outlays are base cost estimates.

would be offered on a sandwich-type 1/ mode and the Multi-Point Entry and Credit system instituted. A list of the proposed new Polytechnics to be established as well as those to be strengthened by the States and Delhi, is outlined in **Annex 10**. The States 2/ have identified and acquired the sites for the location of the new Polytechnics and developed preliminary designs and cost estimates on the basis of planned academic programs and schedules of accommodation. During negotiations, the GOI provided an assurance that it shall withhold and cause the project States and Delhi to withhold the establishment of any new publicly funded Polytechnic in the project States and Delhi without the prior approval of the AICTE. A list of the Polytechnics introducing the Multi-Point Entry and Credit System which would be a central feature of the New Polytechnics is shown in **Annex 11**. During negotiations, the States and Delhi provided assurances that they shall introduce in a phased manner, the Multi-Point Entry and Credit System in selected disciplines and Polytechnics.

3.10 Programs in Continuing Education. Recognizing that the technical education system must be flexible enough to be responsive to the needs of the large stock of technicians who require updating and new skills, the project calls for the expansion of continuing education activities at the diploma level. About 40 Continuing Education Centers and Departments would be established in the respective State Boards of Technical Education and in selected Polytechnics. The Centers would assist the Departments in developing programs required by industry and the formulation of course content for the conduct of these programs. The TTTIs would assist the States in establishing the Continuing Education Centers and Departments. A list of the Polytechnics by State and the number of Continuing Education programs by State is shown in Annex 12. During negotiations, the States and Delhi provided assurances that they shall cause their respective Polytechnics to charge fees to recover the full costs of continuing education programs being administered by them for public and private sector industry.

3.11 Community Polytechnics. In order to spread the impact of the technician education system which presently caters mainly to the needs of the organized sector, the Government in 1978 arranged for certain Polytechnics to prepare training programs aimed at stimulating the awareness of science and technology at the village level. Today, about 129 "Community Polytechnics" provide rural development training programs. Under the project, about 54 Polytechnics would be expanded to become Community Polytechnics. Community Development Cells will be developed at each Polytechnic. Village Extension Centers would also be established to offer assistance in appropriate technology, rural production in self-generating enterprises and the carrying out of needs surveys to facilitate employment and the start-up of new businesses. Resources would be also provided to construct and equip Village Production Centers to provide technical assistance and staff to carry out studies and surveys, and to give general support such as seed-money to stimulate the initiation of new rural production. The new Community Polytechnics by State are shown in **Annex 13**.

1/ Combination of institutional and on-the-job training.

2/ All references to "the States" mean the eight project States and the Union Territory of Delhi.

3.12 Programs for Women. Training at the technician level in Women's Polytechnics or in Wings attached to coeducational Polytechnics is already established in several States. However, overall only a small number of women, about 14% of enrollment, now participate in technician education, largely because of an absence of residential accommodation, and their reluctance to enroll in coeducational institutions. The National Policy on Education of 1986 recommended that a larger proportion of technical education and training be given to women at all levels and that the focus should be on modern technologies for industrial employment.

3.13 The project will support an expansion of technician training opportunities for women. Nine (9) new Women's Polytechnics with residential accommodation will be provided, and Wings for women would be added to 6 existing Coeducational Polytechnics. Each new Women's Polytechnic would offer three to six diploma courses of 2-3 years duration. In addition, short courses will be provided as a part of continuing education for women technicians. Most States presently offer incentives for this training by providing tuition without fees, free transportation and accommodation. Also, State Governments offer assistance to place graduates in industry and are creating a placement mechanism for this purpose. The project will therefore support on-going and expanded scholarship programs for female students in each State. A list of the new and existing Women's Polytechnics to be established and supported in the project States is shown in **Annex 14**. In addition, hostels and other facilities for women would be provided in all existing Coeducational Polytechnics in order to expand training places for women in technician education. The States have already identified and acquired the sites for Polytechnics to be constructed in the first year of the project, prepared preliminary designs, undertaken site surveys and prepared cost estimates for the new Women's Polytechnics. During negotiations, the States and Delhi provided assurances that they shall develop and expand diploma programs for women and in conjunction therewith, make concurrent efforts including the establishment of a Special Cell in each Women's Polytechnic, to identify and obtain suitable employment opportunities for women.

3.14 Student and Faculty Housing. Any program of capacity expansion also increases the need for additional student hostels and faculty and staff housing. At the Polytechnics, hostel places would be constructed for about 4,625 boys and for about 7,000 girls, and houses for about 1,026 teachers and 814 support staff. The States have provided preliminary designs, site surveys and cost estimates for the construction of the facilities to be constructed during the 1991-1992 period. **Annex 15** shows the summary of the proposed civil works program by year.

3.15 In summary, the activities which will be supported under the project will increase the present total annual enrollment capacity of the technician education system in the project States by about 30,430 in 1998 from a present total enrollment of about 93,475 (**Annex 16**). Of the additional places created, about 21,460 or 70% would in the new and emerging technology areas, 8,970 or about 30% would be dedicated to women technicians and would represent a 50% increase in female participation in technician education from the present 14%. Only 15% would be in the conventional areas of civil, mechanical and electrical engineering. The project would support capacity expansion by financing civil works, furniture, equipment, vehicles, foreign and local experts and fellowships, and the salaries of incremental staff and incremental supplies on a declining scale.

D. Quality Improvement (Proposed Outlays US$138.15 million)

3.16 Teacher Training. In addition to the strengthening of TTTIs which is supported under the first Technician Education project, teacher training would also be undertaken by each of the participating States. To expand their current efforts at staff training and career development, each State would establish Staff Development Centers in the State Boards of Technical Education and Staff Development Cells in selected Polytechnics. Overall, 10 Centers and 41 Cells would be established. These Staff Development Centers/Cells would have the capacity to identify the learning needs, and to design tailor-made programs of pre-service, in-service and on-the-job training in collaboration with the TTTIs, for individual teachers. This individualized attention would be a part of the career development structure to be established in each State to recruit, tra· and retain in service, competent teachers and administrators for the technic education system. About 200 technical teachers will be trained abroad to increase their competence in planning, organizing and managing these new technology programs. Another 600 teachers will be trained in Indian industries in new areas, making instructional processes more relevant and increasing industry-institution interaction. Finally, about another 1,200 technical teachers will be trained at the TTTIs or their Extension Centers in the States, in the areas of curriculum development, education technology, instructional resources and content updating as it relates to these new technologies. The number of additional teachers to be appointed and trained by State is shown in **Annex 17**. Each State has prepared a draft comprehensive staff development and teacher training plan. They have also started the process of filling all sanctioned but vacant teacher posts. During negotiations, the States and Delhi provided assurances that they shall (a) provide additional staff to their Polytechnics in accordance with an agreed Schedule of Deployment of Key Additional Staff (**Annex 18**); and (b) institute by January 31, 1992, a Faculty Development System for technical teachers in accordance with a plan satisfactory to the Association (**Annex 19**). In addition, the States and Delhi provided assurances that they shall prepare and furnish to the Association by December 31 of each year, draft annual plans for the next fiscal year for the training of teachers, including local and foreign fellowships.

3.17 Curriculum Development. To meet the needs of curriculum reform, each of the eight States and New Delhi would establish a Curriculum Development Center. The CDCs will have as their major objectives to: (a) undertake surveys/studies to identify education and training needs of technicians; (b) design and develop needs-based curricula in cooperation with the TTTIs; (c) develop standards/ guidelines for States to implement the curriculum; (d) facilitate the introduction of flexible course structures by bringing about appropriate curriculum changes; (e) periodically review and update curricula for diploma programs; (f) collaborate with national, regional, state institutions/agencies having similar objectives; (g) liaise with industry for practical input to curriculum d. lopment; and (h) monitor progress of implementation of curricula in technician institutions and advise corrective actions where required. Special focus and emphasis would be given to generating awareness of environmental concerns in different technical curricula and specifically for industrial technology, developing curricula regarding more efficient industrial processes which generate less pollution as well as technologies which treat pollutants. The BTE has already developed guidelines and issued them to the States on either how to incorporate environmental concerns into existing curricula and/or how to prepare new curricula on the environment. During negotiat s, the States and

Delhi provided assurances that they shall prepare and furnish to the Association by December 31 of each year, a draft annual plan for the next fiscal year for the introduction of new technician programs in their respective Polytechnics.

3.18 Equipment and Facility Improvement Programs. In order to undertake the new programs as well as improve the quality of the conventional courses being offered, the laboratories and workshops in the Polytechnics would have to be re-equipped. Under this component, new equipment would be provided, obsolete equipment replaced and/or modernized, and new facilities either constructed or existing structures remodelled to house new laboratories, workshops and Learning Resource Cells. Introduction of computers for instructional and managerial functions will be another dimension of modernization. About 230 Polytechnics would be modernized. As a result, about 800 workshops and laboratories would be updated and reequipped, 188 Computer Centers established and 200 Learning Resource Development Centers and Utilization Cells developed in the project States. Preliminary equipment lists for new and existing courses have been developed under the first Technician Education project. The States have each already developed more detailed equipment and furniture lists including specifications and a procurement plan for the first two project years.

3.19 Maintenance Cells. Both preventive and repair maintenance capabilities of buildings and equipment would be developed for each State's Polytechnic system. The States would establish Maintenance Cells in each Polytechnic and at the State Headquarters. The Maintenance Cells will either carry out maintenance and repair themselves, have it undertaken locally, or enter into service contracts with service organizations. During negotiations, the States and Delhi provided assurances that they shall (a) provide adequate resources for their respective Polytechnics for the maintenance of buildings and equipment; and (b) delegate appropriate financial powers to Polytechnic Principals to enable them to undertake annual maintenance programs at their respective Polytechnics.

3.20 The training and upgrading of teaching staff, modernization of curriculum, equipment and facilities is expected to improve the quality of trainees graduating from the Polytechnics. It is projected that by the end of the project, about 2,000 new and about 18,000 existing untrained teachers would be trained, the curriculum for the majority of existing and new courses would be either reviewed, revised and/or developed, and about 600 outdated workshops/laboratories would be modernized. In addition, 52 Staff Development Centers/Cells will be developed in the project States. The project would support quality improvement by financing civil works, furniture, equipment, vehicles, books, learning materials, local and foreign fellowships and experts, and the salaries of incremental staff and consumable materials on a declining scale.

E. Efficiency Improvement (Proposed Outlays US$29.60 million)

3.21 The project will support a number of activities which are designed to increase the internal and external efficiency of the system. The State Directorates and Boards of Technical Education would be strengthened, academic autonomy would be granted to selected Polytechnics, and Industry-Institute Interaction programs undertaken.

3.22 Strengthening State Directorates and Boards of Technical Education. Under this subcomponent, provision would be made to train officers in modern education management through local and external fellowships as well as

interaction with local and foreign consultants. The State Directorates and Boards of Technical Education would be strengthened to include computerized management information centers as well as specific other professional departments. Each of the States have prepared an organizational chart of the existing set-up and developed a plan for the proposed strengthened DTE and Boards, including job descriptions of key personnel. During negotiations, the States and Delhi provided assurances that they shall maintain and provide additional staff to their respective Directorates and Boards of Technical Education in accordance with an agreed Schedule of Deployment of Key Additional Staff.

3.23 Granting Autonomy. Autonomy is envisaged for the Polytechnics, but the process of achieving it would be phased. During the project period only 26 or about 11% of the 240 Polytechnics in the project States would receive academic as well as some degree of financial autonomy. The main purposes of restructuring the internal management of the Polytechnics are to: (a) secure the academic autonomy envisioned under the National Policy on Education of 1986 (NPE); (b) introduce adequate flexibility into the academic program by organizing credit-based courses and multi-point entry; and (c) clearly identify decision-making authority. One specific outcome of academic autonomy is that each of the autonomous Polytechnics would have to organize a confidential examination, and for this purpose, Centers would be established at each institution to revise current examination practices and develop more rational student assessment systems. These examination centers would be supported under the project.

3.24 Promoting Industry-Institute Interaction. The extent of interaction between industry and Polytechnics which exists today is insignificant and the States will develop mechanisms and procedures to promote this activity under the project. The major objectives would be to: (a) organize systematic industrial training for students and teachers of Polytechnics; (b) involve industry in the areas of curriculum development, instructional material development, training of students and teachers; (c) undertake consultancy/assist industries in solving problems relating to shop floor production and field work; (d) help industries in the in-service training of working technicians; and (e) carry out research studies for gathering data useful for technician education planning and curriculum planning. A list of the Polytechnics which will introduce Industry-Institute Interaction Programs by State is shown in **Annex 20.**

3.25 At each Polytechnic, an Advisory Committee will be established to discuss problems relating to practical training of staff and students, suggest solutions, ensure participation of professionals from Industry in the training of students, and to identify problems of industry which can be handled by the Polytechnic. In addition, an Industry-Institute Interaction Cell will be established at each Polytechnic and be headed by the training-cum-placement officer. The Cell would liaise with Industry for the practical training of students. It would also prepare profiles of different types of technicians working in industry, identify the shortcomings perceived by the industry in regard to the curricula and formulate schemes under which students will be given project work and Polytechnics consultancies. The Cell will also arrange for the training of teachers in industry.

3.26 At the Directorate level, an Industry - Institute Interaction Cell would be established to gather and collate the information received from the Polytechnic Cells, analyze such information and formulate specific suggestions on

the problems encountered in achieving the goals of Industry - Institute Interaction. During negotiations, the States and Delhi provided assurances that they shall promote close interaction of Polytechnics with industry by (a) developing and implementing Industry-Institute Interaction programs satisfactory to the Association; (b) constituting an Industry-Institute Cell at each of their respective Polytechnics and Directorates of Technical Education; and (c) appointing Advisory Committees and Industrial Liaison and Placement Officers to head the said Industry-Institute Interaction Cells.

3.27 In summary, the internal and external efficiency of the technician education system would be improved considerably by the proposed investments. It is expected that repeaters would diminish, decision-making in the Directorates would be undertaken on a more scientific and technical basis, more flexibility would be introduced into the system, industry-institution linkages improved, and the Polytechnics would function more efficiently. The project would support efficiency improvements by financing civil works, equipment, vehicles, furniture, local and foreign training and consultants, and the salaries of incremental staff and consumable materials on a declining scale. The technical assistance requirements of foreign and local consultants and fellowship training, for all project components are shown in **Annex 21**. During negotiations, the GOI provided an assurance that by December 1, 1991, jointly with the States and Delhi, it shall develop, institute and thereafter maintain fellowship training programs, including study tours, as agreed to by the GOI and the Association.

IV. PROJECT COST, FINANCING, IMPLEMENTATION AND DISBURSEMENTS

A. Costs

4.01 Summaries of Costs. The total cost of the project, including duties and taxes, is estimated at about Rs.8,252.21 million or US$362.1 million equivalent. The breakdown of costs of the proposed project by component, categories of expenditure and sub-component for the eight States and New Delhi is summarized in Tables 4.1 and 4.2. Detailed costs of the project by component, categories of expenditure, and time are given in **Annex 22**.

4.02 Basis of Cost Estimates. Estimated costs for civil works are based on current unit costs for construction which vary from US$15 to US$20 per sq. ft. of gross floor area of construction. These costs are reasonable for comparable Bank Group-assisted construction in India. Costs of professional services for design and top supervision of construction reflect the scale of fees established for similar services provided by local architectural consulting firms. Costs for the preparation of tender documents and for on-site supervision reflect the standard establishment charges of the PWD in the States of 15%. Estimated equipment and vehicle costs are products of lists developed by GOI and the States, and include import duties and taxes. Furniture and consumable material costs are based on GOI and State estimates and reflect current prices. Estimated costs for the salaries of additional staff are based on basic pay scales including standard allowances for social and other benefits applicable in the project States.

Table 4.1: Costs by Component/Sub Component

Component	Rupee (Million) Local	Foreign	Total	US$ (Million) Local	Foreign	Total	% of Base Costs
Capacity Expansion							
New Tech. Programs	584.23	174.00	758.23	32.45	9.67	42.12	13
New Polytechnics	345.69	108.59	454.28	19.21	6.03	25.24	8
Continuing Educ.	150.12	17.39	167.51	8.34	0.97	9.31	3
Community Polytechnics	119.09	30.59	149.68	6.62	1.70	8.32	3
Women's Polytechnics	465.89	139.53	605.42	25.88	7.75	33.63	10
Hostels & Residences	524.15	167.12	691.27	29.12	9.28	38.40	12
Subtotal	2189.17	637.22	2826.39	121.62	35.40	157.02	49
Quality Improvement							
Teacher Training	242.08	65.16	307.24	13.45	3.62	17.07	5
Curriculum Developmt.	39.29	7.61	46.90	2.18	0.42	2.60	1
Modernization	1393.70	604.89	1988.59	77.43	33.61	111.04	34
Maintenance Cells	112.95	21.01	133.96	6.27	1.17	7.44	2
Subtotal	1788.02	698.67	2486.69	99.33	38.82	138.15	42
Efficiency Improvement							
Strengthening State Directorate & Boards	272.44	47.99	320.43	15.13	2.67	17.80	5
Autonomous Polytechnics	23.44	3.87	27.31	1.30	0.22	1.52	1
Industry-Institute Interaction	159.60	25.49	185.09	8.87	1.41	10.28	3
Subtotal	455.48	77.35	532.83	25.30	4.30	29.60	9
Total Bas Costs	4432.67	1413.24	5845.91	246.25	78.52	324.77	100
Contingencies	1625.08	781.22	2406.30	19.14	18.19	37.33	11
TOTAL PROJECT COSTS	6057.75	2194.46	8252.21	265.39	96.71	362.10	111

Table 4.2: Costs by Categories of Expenditure

Category of Expenditure	Rupee (Million) Local	Foreign	Total	US$ (Million) Local	Foreign	Total	% of Base Costs
Investment Costs							
Civil Works	1613.83	561.08	2174.91	89.66	31.17	120.83	37
Furniture	177.16	32.62	209.78	9.84	1.81	11.65	4
Equipment	938.96	652.19	1591.15	52.16	36.23	88.39	28
Vehicles	39.87	41.52	81.39	2.22	2.31	4.53	1
Books	68.00	17.73	85.73	3.78	0.98	4.76	1
Foreign Fellowships	4.96	46.53	51.49	0.27	2.59	2.86	1
Local Fellowships (incl. Scholarship for Girls)	111.92	-	111.92	6.22	-	6.22	2
Local Consultants	27.34	-	27.34	1.52	-	1.52	-
Foreign Consultants	0.63	1.54	2.17	0.03	0.09	0.12	-
Subtotal	2982.67	1353.21	4335.88	165.70	75.18	240.88	74
Recurrent Costs							
Salaries of incremental Staff	1096.55	-	1096.55	60.92	-	60.92	19
Consumable Materials	197.41	51.46	248.87	10.96	2.86	13.82	4
Operation and Maintenance	156.04	8.57	164.61	8.67	0.48	9.15	3
Subtotal	1450.00	60.04	1510.04	80.55	3.34	83.89	26
Total Base Costs	4432.67	1413.25	5845.92	246.25	78.52	324.77	100
Contingencies	1625.08	781.22	2406.30	19.14	18.19	37.33	11
TOTAL PROJECT COSTS	6057.75	2194.46	8252.21	265.39	96.71	362.10	111

NOTES: Subtotals may not add to totals due to rounding.
Costs include taxes and duties.

4.03 Customs Duties and Taxes. All imported goods are subject to customs duties and taxes. The estimated cost of the project includes import duties and taxes estimated at about US$10.7 million.

4.04 Contingency Allowances. Estimated project costs include physical contingencies (US$28.9 million) estimated at 10% of all physical components and at 5% for technical assistance, consumable materials and operation and maintenance costs. The estimated costs of the project also include price contingencies (US$8.5 million) to cover expected price escalation at the following rates. For civil works, goods, salaries and technical assistance-foreign costs 3.6% in FY91 through FY99; local costs: 7% in FY91 and FY92, 6.6% in FY93; 6.5% in FY94 and FY95; 6.2% in FY96 and 6% in FY97 and FY98.

4.05 Foreign Exchange Component. The estimated foreign exchange component of US$96.7 million is calculated on the basis of estimated foreign exchange proportions as follows: (a) civil works 25%; (b) furniture 15%; (c) locally produced equipment 35%; (d) locally produced vehicles 50%; (e) international fellowships 90%; (f) locally produced consumable material 20%; (g) operation and maintenance costs at 5%.

B. Financing Plan

4.06 The estimated total project cost of US$362.1 million would be financed by an IDA credit of US$307.1 million equivalent, which would cover about 87% of costs net of taxes. The States would finance the net costs of US$29.8 million and GOI would finance the remaining US$25.2 million including all taxes estimated at US$10.7 million. The financing plan by project component and by categories of expenditure is outlined in **Annex 23**.

C. Recurrent Cost Implications

4.07 When the project becomes fully operational in FY 1998, it would require Rs.440.0 million (US$17.1 million) annually in recurrent expenditures. The impact of the recurrent cost of the project on projected recurrent technical education budgets of each State is shown in **Annex 24**. These levels represent a significant increase in recurrent budget outlays for technician education over the previous years of the Sixth and Seventh Five-Year Plans. The new levels of recurrent expenditure will be sustainable in the future because, (a) the States have been made aware very early in the project development process that an increased commitment would be required, and they have demonstrated their willingness to sustain this level of activity by budgeting their own resources (as opposed to DOE) during the investment phase of the project; (b) there has been an overt recognition that the low-level of recurrent expenditure in the past has led to qualitative degradation of the system; and (c) the internal revenue generation and other efficiency measures to be instituted would inevitably reduce some of the financial burden on the States.

D. Status of Preparation

4.08 Designs and Drawings for New Polytechnics and Workshops. Standard designs for the construction of Polytechnics already exist in each State. These are consistent with approved government standards. Preliminary designs and/or sketch plans for the civil, mechanical, electrical, electronic and computer engineering laboratories/workshops, and the additions to existing institutions have been prepared for the first two years of construction. A civil works General Implementation Schedule as well as a Furniture and

Equipment General Procurement Plan have been prepared and are shown in **Annex 25**.

4.09 Sites. Sites for the new Polytechnics both coeducational and female, and for hostels and faculty housing have been identified. New workshops would for the most part, be constructed as expansions to existing institutions and therefore little additional land would be required. The annual construction programs which are to be developed by the States will give priority to those institutions where the land is already available. During negotiations, the States and Delhi provided assurances that they shall prepare and furnish to the Association by December 31 of each year, draft annual plans for the next fiscal year for the construction of new and rehabilitation of existing facilities.

4.10 Furniture, Equipment, Books, Vehicle and Consumable Training Material lists have been prepared by the States and reviewed during appraisal.

4.11 Technical Assistance (Local and Foreign Consultants, Studies, Training Plans, including Fellowship, Training and Organizational Development). Each State and Delhi has completed detailed staffing plans for new and existing institutions, developed draft teacher training schedules, draft terms of reference for local and foreign consultants, started the detailed work of preparing curricula and course outlines for the various types of training and developed draft maintenance plans. Each of the project Polytechnics has also developed or are in the process of developing a Detailed Project Report (DPR) indicating how it would implement each of the proposed project components/sub-components.

E. Project Management/Implementation

4.12 The executing agency for the Project will be the Bureau of Technical Education (BTE) in which a National Project Directorate (NPD) has already been established under the first Technician Education Project. A National Project Implementation Unit (NPIU) has also been established in the Educational Consultants India Ltd (EDCIL) as a part of that project. All staff have been appointed to make it fully operational. The NPD and NPIU are presently assisted by Steering and Advisory Committees, but the Steering Committee has been upgraded to an Empowered Committee. The currently functioning NPIU would work closely with State Project Implementation Units (SPIUs) which would be established in each of the State Directorates. Each Polytechnic in which project components are to be implemented will also have a Project Implementation Cell (PIC). The main functions which the NPIU is now performing for the first Technician Education Project would be expanded for this project and include (a) liaising with the Association, the Department of Economic Affairs, the Ministry of Human Resource Development, the Directorate General of Supplies and Disposal (DGS&D), the All India Boards of Technician Education and Continuing Education, the three professional divisions of the AICTE, the TTTIs, State Governments, Directorates of Technical Education and the concerned Polytechnics; (b) providing direction and guidelines to the Project Implementation Centers on project implementation; (c) arranging for procurement of equipment through DGS&D and other equipment and civil works through the Project Facilitation Units (PFUs) in the respective States/TTTIs; (d) monitoring and reviewing the implementation of the project and reformulating implementation schedules where necessary; (e) arranging for technical assistance services for the project; (f) identifying places/institutions for fellowship training and selecting staff to undergo fellowships; (g) reviewing and evaluating the project from time to time as

well as undertaking needs assessment and studies in various areas, including Labor Markets and the Employment of Polytechnic Graduates; The Costs and Financing of Polytechnic Education; Production and Management Reform in the Industrial Sector and the Impact on Polytechnic Training; The Participation of Female Polytechnic Graduates in the Modern Industrial Sector; and, Technology Transfer and the Development of Training in Environmental Sciences in Polytechnics. During negotiations, the Government provided an assurance that it shall maintain adequate staff in the NPIU according to an agreed Schedule of Deployment of Key Additional Staff.

4.13 The National Project Directorate is headed by a Project Director with the experience and status equivalent to a Joint Education Adviser (Technical Education). The NPIU is headed by a Project Advisor, and has Academic, and Resources Wings each with a number of Units. The first Unit is responsible for coordinating, monitoring and reporting on procurement of goods and civil works and award of contracts. The second Unit is responsible for accounts and administrative matters as well as the organization and administration of consultant services and fellowship programs. The third Unit is mainly concerned with monitoring, review and evaluation and the operation of the computer-based management information system. The linkages between PIUs at the different levels and the organizational chart of the National Project Implementation Unit are shown as **Charts 5 and 6.**

4.14 At the regional level, Project Facilitation Units (PFU) exist at each of the four TTTIs and work closely with the Academic Wing of the NPIU and concentrate on the pedagogical and professional aspects of the project like curriculum, teaching and learning resource development, planning of programs, utilizing consultant services, data gathering and the analysis and reporting to the respective authorities on problems faced during implementation. During the negotiations, the Government provided an assurance that it shall maintain adequate staff in the TTTIs according to an agreed Schedule of Deployment of Key Additional Staff.

4.15 Each State and Delhi would establish an Empowered Committee and a State Project Implementation Unit (SPIU) which would: (a) provide guidelines and directions for meeting targets to the Project Implementation Cells within the Polytechnics; (b) disburse funds to institutions within the State; (c) monitor and review project progress at frequent intervals and reformulate implementation schedules; (d) provide data on a continual basis to the NPIU within EDCIL; (e) arrange for and utilize local consultants; and (f) liaise with the NPD, NPIU, the PICs, the TTTIs and other agencies involved in implementation. The States and Delhi have established their Empowered Committees, identified and deputed Project Directors to the SPIUS, and appointed architects to their respective SPIU.

4.16 The Project Implementation Cells (PICs) in the Polytechnics would be responsible for needs assessment and optimizing the use of resource inputs which are provided. Periodic progress reporting, problem identification and solving at the institutional level would also be the responsibility of these Cells. During negotiations, the States and Delhi provided assurances that they shall provide additional staff, to the SPIU and Polytechnics in accordance with an agreed Schedule of Deployment of Key Additional Staff.

F. Monitoring, Review and Evaluation

4.17 The NPIU/PFUs/SPIUs at the national, regional and State levels would be responsible for gathering data at periodic intervals, processing it and furnishing information to different agencies. A computerized Management Information System (MIS) would be developed at the NPIU and the SPIUs. It will contain all relevant project data and will produce output in a format which will facilitate monitoring and supervision. The GOI and the Association have agreed on the Key Indicators of Progress and these are shown in **Annex 26**. During negotiations, the GOI, the States and Delhi provided assurances that they shall: (a) develop and establish a MIS in the NPIU and SPIUs, (b) in conjunction with each other, implement a Project Supervision Plan as agreed with the Association (**Annex 27**) and (c) undertake in conjunction with each other and the Association, an annual review of project progress on the basis of monitorable benchmarks agreed to by the Project States, Delhi and the Association. The project's success would be measured on the basis of several input and output variables. The key measurable inputs would be the number of new technology courses introduced, the percentage of new and existing teachers who would be trained and upgraded, and the number of workshops and laboratories which would be modernized and made operational. The key measures of success would be the increased numbers of graduating students, especially women, the number of students who would have graduated under the Multi-Point Entry and Credit System, and the increased percentage of students and teachers who would have received industrial experience as part of their training.

G. Disbursements

4.18 Disbursement Percentages. The IDA Credit would be disbursed against 90% of expenditures on civil works; 100% of CIF or ex-factory costs and 80% of other local costs on furniture, equipment, vehicles, books and instructional materials; 100% of expenditures on consultant services and training; and on a declining scale for salaries of incremental staff and incremental supplies as follows; 80% until June 30, 1995; and 65% thereafter for an overall average of 71%.

4.19 Required Documentation. Disbursements in respect of contracts for civil works to cost less than US$300,000 equivalent and for goods, consultant services and training valued at less than US$200,000 equivalent, and for incremental salaries and incremental supplies would be made against Statements of Expenditure by the respective Project Coordinators in the States. Documentation for contracts with expatriate consultants and foreign fellowship training only would be retained by the NPIU, and for all other activities by the States. These would be made available for review by IDA staff during the course of supervision missions. All other disbursements would be made against fully documented withdrawal applications.

4.20 Special Account. In order to accelerate disbursements in respect of the IDA's share of expenditures prefinanced by GOI and the States, and in order to allow for direct payment of other eligible local and foreign expenditures, a Special Account would be opened in the Reserve Bank of India with an initial deposit of US$13.0 million equivalent to cover four months of expected requirements for IDA financed items.

4.21 Retroactive Financing up to US$3.0 million equivalent is provided to cover eligible expenditures after September 30, 1990 for costs incurred in preparing and implementing appraised project activities.

4.22 Disbursement Profile. The proposed IDA credit would be disbursed over an eight-year period. This is realistic given the design and institutional development activities of the project. The preappraisal mission evaluated the capacity of all project institutions to effectively implement their programs in a timely manner. Specific emphasis and analysis was given to the implementation of civil works and the procurement of equipment, including the capacity of the PWDs in the States and the DGS&D at the Center to plan, coordinate and monitor the civil works and equipment procurement programs. Project duration therefore encompasses not only the time required for the physical completion of various components but also includes an operational period where the impact of training, and the management and administrative reorganization elements of the project can be observed and measured. The project is expected to be completed on December 31, 1998, and closed on June 30, 1999. The standard profile for education projects in Asia is seven and one half years. The design of the project, the current status of preparation, the measures which would be taken to expedite procurement and disbursement, and the fact that the first Technician Education Project (May 1990) has an eight year profile, reinforce the justification for an eight year disbursement profile. A forecast of annual expenditures and disbursements is shown in **Annex 28.**

H. Procurement

4.23 Procurement arrangements of the project are outlined in Table 4.3. Contracts for Civil Works (US$135.30 million). The project would include construction of various types at the 240 Polytechnics which are scattered over the eight project States and Delhi and would be awarded over a five to six year period (Annex 15). ICB is not therefore the most suitable mode of procurement. Contracts for civil works would be awarded under LCB procedures acceptable to the Association and foreign-firms registered in the country will be able to participate. It is estimated that contracts exceeding US$300,000 representing about US$74.42 million equivalent or 55% of total civil works costs would be awarded under LCB. Contracts for civil works below US$300,000 equivalent, up to an aggregate amount not exceeding US$46.0 million equivalent or about 34% of the total cost of civil works would be awarded on the basis of comparison of price quotations solicited from at least three contractors eligible under the Guidelines. Civil works contracts for small extensions and renovations, estimated to cost less than the equivalent of US$50,000 per contract up to an aggregate amount not exceeding US$15.0 million would be either directly negotiated with one contractor or carried-out departmentally by the Public Works Department.

4.24 Contracts for Furniture, Books and Instructional Materials (US$20.0 million) which would be spread amongst a variety of users over the life of the project would not be appropriate for ICB, and therefore would be let through LCB procedures which are acceptable to the Association. All furniture, books and instructional materials are available from local manufacturers at very economical prices. For English language textbooks in particular, foreign firms would be encouraged to bid. Contracts for the purchase of furniture, books and instructional materials estimated to cost less than the equivalent of US$50,000 up to an aggregate of US$7.29 million may be awarded on the basis of local shopping, with solicitation of price quotations from at least three suppliers.

4.25 Contracts for Equipment and Vehicles (US$107.0 million). The project States and Delhi will use the Directorate General of Supply and Disposal (DGS+D) for the centralized procurement of a large share of the equipment and

vehicles and continue the system initiated under the first Technician Education project. Contracts of US$200,000 equivalent or more each for equipment and vehicles would be awarded on the basis of ICB. About US$54.0 million equivalent suitable for bulk purchasing and representing 50% of total equipment and vehicle costs would be procured under ICB. DGS+D tender documents which are acceptable to the Association have already been prepared. About US$35.0 million equivalent or about 33% of the cost of equipment and vehicles, would be procured under LCB procedures which include foreign participation. These are small purchases to be made by the 240 Polytechnics over the life of the project and therefore ICB is not practical. Purchases of other equipment costing less than US$50,000 each and not exceeding in aggregate about US$16.0 million equivalent or about 15% of total equipment and vehicle costs, may be awarded on the basis of prudent shopping with solicitation of price quotations from at least three suppliers. Equipment of a proprietary nature, up to an aggregate amount of US$2.0 million equivalent may be procured under contracts negotiated directly with the suppliers of such equipment. The list of proprietary equipment to be purchased directly will be subject to the Association's prior review.

Table 4.3: Procurement Method

Categories of Expenditure	US$ Millions ICB	LCB	Other	NA	Total Cost
Civil Works	-	74.42	60.88	-	135.30
incl. Prof. Fees		(66.98)	(53.22)		(120.20)
Furniture	-	7.74	5.16	-	12.90
		(6.96)	(4.54)		(11.50)
Equipment & Vehicles	53.50	35.20	16.05	2.25	107.00
	(48.15)	(31.71)	(14.44)	(1.50)	(95.80)
Books & Instructional	-	4.97	2.13	-	7.10
Materials		(4.41)	(1.89)		(6.30)
Local Consultants	-	-	1.60	-	1.60
			(1.40)		(1.40)
Foreign Consultants	-	-	0.10	-	0.10
			(0.10)		(0.10)
Local Fellowships	-	-	-	4.70	4.70
(incl. Scholarships for Girls)				(4.70)	(4.70)
Foreign Fellowships	-	-	-	3.40	3.40
				(3.40)	(3.40)
Salaries of	-	-	-	64.10	64.10
Incremental Staff				(51.18)	(51.18)
Incremental	-	-	-	25.90	25.90
Operational Costs				(12.52)	(12.52)
TOTAL	52.50	122.33	85.92	100.35	362.10
IDA	48.15	110.06	75.59	73.70	307.10
States	0.55	8.85	4.25	16.15	29.80
GOI	4.80	3.42	6.08	10.90	25.20

Note: Figures in parentheses represent IDA financing.

For equipment procured under ICB, a 15% domestic preference or the prevailing import duties, whichever is lower, may be accorded for locally manufactured equipment. All procurement under ICB would be subject to prior review and approval of the Association.

4.26 Technical Assistance (US$1.7 Million). Foreign and Local consultants for capacity building would be selected according to the IDA Guidelines for

the Use of Consultants and would be subject to prior review and approval of the Association.

4.27 IDA Review. Civil works contracts exceeding US$300,000 which represent 55% of the total cost of civil works and all equipment and vehicles procured under ICB representing about 50% of total equipment and vehicle costs, would be subject to prior review and approval by the Association. For civil works contracts awarded under LCB, the Association would approve for each State and Delhi, standard bid documents which would be used throughout the project. Contracts for furniture, books and instructional materials over US$200,000 each and totalling about US$13.0 million or about 65% of the total cost of furniture, books and instructional materials would be procured through local competitive bidding and subject to prior review by the Association. Overall, about 60% of the project costs would be subject to prior review. This percentage of prior review is considered satisfactory in view of the agreed use of standard documents for LCB.

I. Accounting and Auditing

4.28 The project would be subject to normal GOI accounting and auditing procedures which are considered satisfactory to IDA. The State Directorates would maintain separate project accounts. The GOI and each State and Delhi agreed during negotiation that: (a) accounts and financial statements for each fiscal year would be prepared and audited by independent auditors acceptable to the Association; (b) statements of expenditures would be maintained in accordance with sound accounting practices, be maintained at least one year after the completion of the audit for the fiscal year in which the last withdrawal was made and a separate opinion on SOEs be included in the annual audit; and (c) certified copies of the audited accounts including the Special Account and financial statements for each fiscal year, together with the Auditor's Report would be furnished to the Association as soon as available, but not later than nine months after the end of each fiscal year.

V. BENEFITS AND RISKS

A. Benefits

5.01 A major benefit of the proposed project is that it would provide technicians of suitable quality and in the numbers required by the public and private industrial sector in India. Over the project period about 30,500 additional technician training places would be created, representing about 40% of estimated total technician training needs. The emphasis given to the promotion of Continuing Education and Distance Learning programs means that there is a recognition that the system must also serve the rural and informal sectors. These programs because of their design, content, and duration are more suitable for working technicians, as well as skilled workers in the informal sector. Expanded programs for women also means that serious efforts are underway to more fully integrate women into the modern sector and expand their opportunities for wage employment. Ultimately, the major benefit of the project beyond numbers of students trained, is that it would assist in the reformation of policies that previously constrained the Polytechnic system and support institutional development processes such as the introduction of flexibility in student entrance and graduation requirements, granting academic, financial and administrative autonomy to a selected number of Polytechnics in a phased manner, faculty development for teachers and instructors, creating Curriculum Development Centers to develop courses and training techniques which meet new and emerging sector requirements, and the

institutionalization of maintenance, internal revenue generation programs and Institute-Industry Interaction programs. These changes would facilitate the ability of the system to respond to a rapidly changing environment, and would contribute to the technology transfer objective which is a key aspect of development.

B. Risks

5.02 The major risk concerns the ability of individual States to undertake a large integrated program of both policy reform and physical development. This risk has to some extent been mitigated by the detailed Action Plans which have been prepared by each State, the Detailed Project Reports prepared by each Polytechnic and by the enhanced staffing of the Directorates and Boards of Technical Education in the implementing States, and the support to be provided to the States by the BTE and DGS&D in the Center. The problems of implementation should also be minimized to a certain extent by the financing arrangements agreed to by the States and Center, the form of project supervision to be undertaken by the NPIU and SPIUs, the annual reviews of Action Plans and DPRs to be conducted by IDA with the States, and the flexibility built into project design. Another risk is the availability of suitably qualified instructors and the ability of the States to recruit and maintain them in service. Each State has addressed this problem. Beyond incentives such as housing and new pay scales, the development of career development systems which would allow instructors to advance in their careers and also give them the opportunity to take time out to work in industry with no loss of seniority, is expected to assist considerably in overcoming this risk.

VI. AGREEMENTS REACHED

6.01 During negotiations, the GOI provided assurances that it shall:

(a) withhold and cause the Project States and Delhi to withhold the establishment of any new publicly funded Polytechnic in the project States and Delhi without the prior approval of the AICTE (para 3.09);

(b) by December 1, 1991, jointly with the States and Delhi, develop and institute and thereafter maintain fellowship training programs, including study tours, as agreed with the Association (para 3.27);

(c) staff and maintain the NPIU and the TTTIs according to an agreed Schedule of Deployment of Key Additional Staff (paras 4.12 and 4.14); and

(d) in conjunction with the project States and Delhi and the Association, undertake an annual review of project progress on the basis of monitorable benchmarks agreed to by the project States, Delhi and the Association (para 4.17).

6.02 During negotiations, the States and Delhi provided assurances that they shall:

(a) (i) by December 31, 1991, review the current practices and levels of internal revenue generation for their respective Polytechnics and develop plans to increase internal revenue generation through various ways and means; and (ii) cause their respective Polytechnics to charge fees to recover the full costs of continuing education

programs being administered by them for public and private sector industry (paras 3.08 and 3.10);

(b) introduce in a phased manner, the Multi-Point Entry and Credit System in selected disciplines and Polytechnics (para 3.09);

(c) develop and expand diploma programs for women and in conjunction therewith, make concurrent efforts including the establishment of a Special Cell in each Women's Polytechnic, to identify and obtain suitable employment opportunities for women (para 3.13);

(d) (i) provide additional staff to their respective Directorates and Boards of Technical Education, SPIUs, Polytechnics and other related institutions in accordance with an agreed Schedule of Deployment of Key Additional Staff; and (ii) institute by January 31, 1992, a Faculty Development System for technical teachers in accordance with a plan satisfactory to the Association (para 3.16, 3.22, and 4.17);

(e) prepare and furnish to the Association by December 31 of each year, draft annual plans for the next fiscal year for (i) the introduction of new technician programs in their respective Polytechnics; (ii) the construction of new and rehabilitation of existing facilities; and (iii) training of teachers including local and foreign fellowships (paras 3.16, 3.17, and 4.09);

(f) (i) provide adequate resources for their respective Polytechnics for the maintenance of buildings and equipment; and (ii) delegate appropriate financial powers to Polytechnic Principals to enable them to undertake annual maintenance programs at their respective Polytechnics (para 3.19);

(g) promote close interaction of Polytechnics with industry by (i) developing and implementing Industry-Institute Interaction programs satisfactory to the Association and (ii) constituting an Industry-Institute Interaction Cell at each of their respective Polytechnics, and Directorates of Technical Education; and (iii) appointing Advisory Committees and Industrial Liaison and Placement Officers to lead the said Industry-Institute Interaction Cells (para 3.26);

(h) by December 1, 1991, jointly with the GOI, develop and institute and thereafter maintain fellowship training programs, including study tours, as agreed with the Association (para 3.27); and

(i) (i) develop and establish an MIS in the NPIU and SPIUs (ii) in conjunction with the GOI, implement a Project Supervision Plan as agreed with the Association, and (iii) in conjunction with the GOI and the Association, undertake an Annual Review of project progress on the basis of benchmarks agreed to by the GOI and the Association (para 4.17).

6.03 With the above assurances, the proposed project constitutes a suitable basis for an IDA Credit of SDR 213.5 million (US$307.1 million equivalent) to India at standard IDA terms with 35 years maturity.

ANNEX 1

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Polytechnics by State Showing Enrollments (1988/89)

States	Number of Polytechnics					Polytechnics Offering Part time Courses	Polytechnics Offering Post-diploma	Enrollment 1/		
	Total	Public Coed	Women,s	Private	Grand Total			Boys	Girls	Total
Andra Pradesh	56	42	14	23	79	6	3	9,300	2,700	12,000
Assam	8	7	1	-	8	-	2	3,100	350	3,450
Haryana	14	11	3	-	14	1	3	1,870	350	2.220
Himachal Pradesh	4	3	1	-	4	-	2	600	100	700
Maharashtra	51	48	3	187	289	6	6	23,000	3,000	26,000
Punjab	18	14	2	-	18	4	1	3,500	500	4,000
Tamil Nadu	55	44	11	74	129	15	10	19,000	6,400	25,400
West Bengal	30	29	1	-	30	9	-	12,300	250	12,550
Delhi	8	6	2	10	18	3	2	5,355	1,800	7,155
Total	242	204	38	294	589	44	29	78,025	15,450	93,475

Source State Directorates of Technical Education
1/ Does not include Private Polytechnics.

ANNEX 2

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Guidelines for Recognition of Private Polytechnics

Guidelines Laid Down by the All India Council for Technical Education for Fulfilment by the Private Technical Institutions for AICTE's Approval

(a) The financial position of the Organizaton is sound.

(b) The Organization is genuinely interested in the development of technical education and has a history/background of developing educational facilities with or without aid from Central or State Governments.

(c) The management system including Governing Council should be as per guidelines laid down by the AICTE.

(d) The Chairman of the Governing Council shall be appointed as per norms laid down by the AICTE.

(e) The infrastructure and other facilities should be provided as per norms laid down by the AICTE.

(f) The admissions should be made strictly on merit and the institutions concerned should join the entrance test at the national or at the State level or associate with the tests conducted by the technological institutions of national importance or similar other bodies and admit students based on the results of any one of these tests in order of merit.

(g) The tuition and other fees should be prescribed as laid down by the State Government in the over-all criteria prescribed by the AICTE.

(h) The Institute should be financially and academically viable.

(i) The courses to be started should be as per assessed technical manpower needs and should be as far as possible in emerging areas or where employment potential is clearly foreseen.

(j) The accounts of the Institute should be audited by a Chartered Accountant and be open for inspection by AICTE or anybody authorized by it.

(k) The staff should be recruited on all India basis by open selection as per qualification and experience etc., laid down by the AICTE.

(l) The reservation in these private institutions may be provided as per policy of the respective State Governments.

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

The Technical Education System in India

1. Industrial workers in India are developed through a system of publicaly financed training and education institutions, private institutions, informal sector apprenticeship-type training arrangements, and the in-plant training programs conducted by public and private sector enterprises. The publicaly financed technical education system operates at three levels.

2. Certificate level programs produce skilled workers and are operated at about 1,887 Industrial Training Institutes (ITIs) run by the Directorate General of Employment and Training (DGET) in the Ministry of Labor at the Center. About 325,000 students are trained annually in about 140 trade areas, and the entry requirement to these programs is 10 years of basic education. Vocational education certificate level courses are offered in agriculture, business, commerce, health and paramedical, home science and humanities. in addition to engineering trades. Another 1,500 vocational schools offer these courses, admitting about 72,000 students annually. The National Council for Vocational Training at the national level, and the Directorates of Vocational Training in the States look after the planning and operation of this scheme.

3. Diploma program producing middle-level supervisory staff who are designated as technicians, are operated at over 467 Polytechnics. Admission to this program requires 10 years of basic education, and courses are of three years duration in the conventional disciplines of civil, mechanical and electrical engineering. About 20% of the Polytechnics offer programs in other fields. In all, programs are offered in 90 engineering and non-engineering disciplines admitting about 68,000 students annually. A few institutions conduct post-diploma and advanced diploma programs in selected areas.

4. Degree level institutions in engineering can be divided into three groups: Indian Institutes of Technology (IITs); Regional Engineering Colleges (RECs) and State Engineering Colleges (SECs). The 5 IITs offer both undergraduate and graduate and research degree programs with a bias to technology development, and admit about 1,300 students for research and graduate programs each year. These are national institutions and are fully funded by the Government of India (GOI). There are 17 Regional Engineering Colleges (RECs) which offer undergraduate, postgraduate and research degree programs. They have an annual intake of about 4,650 for the Bachelor's Degree and 850 for the Masters Degree. There are 272 State Engineering Colleges which offer undergraduate programs with an annual intake of about 24,000 students. A few of these institutions also offer graduate programs with an annual intake of about 3,800 students.

5. There are four Technical Teacher Training Institutes (TTTIs) which prepare graduates in engineering and diploma holders to become teachers in polytechnics. These institutions have, over the years, developed as resource institutions for the technical education system. In addition to offering in-

service teacher training programs, they also undertake projects in areas such as curriculum, media, and management development, educational research, measurement and evaluation, laboratory instruction, policy analysis, and research and computer education. They also offer consultant services to the central and state governments, industry, and other organizations in the country.

6. Quality Improvement Centers at IITs and other selected institutions offer Masters and Doctoral programs for teachers in Engineering Colleges, REC and IITs; and in addition, organize short courses in various areas of engineering and technology. The Indian Society for Technical Education (ISTE) sponsors a number of summer and winter schools for teachers of engineering colleges, RECs and IITs. The teaching faculty in these institutions include Principal/DIrector, Professors, Associate Professor/Assistant Professors and Lecturers. The sanctioned teaching staff strength of all categories is about 18,000. However, the vacancy rate is about 22%, with vacancies at the lecturer position being 26%, 25.5% at the Assistant Professor level, and about 18.4% at the Associate Professor/Professor positions.

Management and Administration of Technical Education

7. The planning, promotion, and control of technical education rests with the All India Council for Technical Education (AICTE) and the Bureau of Technical Education in Department of Education, Ministry of Human Resources Development at the national level (Chart 3). The system is operated at the state level by the Directorates and State Boards of Technical Education. The AICTE is the apex body providing leadership in the planning, promotion and regulation of technical education in the country. It has five All India Boards of Technical Studies for: (a) Vocational Education (b) Technician Education; (c) Undergraduate Studies; (d) Post-Graduate Engineering Studies and Research; and (e) Management Studies (Chart 4). The Bureau of Technical Education acts as the adminstrative or governmental arm of AICTE and its various Boards, while at the same time, has powers relating to the processing, implementation, monitoring, control and evaluation of programs and projects in Central institutions, and centrally-sponsored and Plan schemes. The National Technical Manpower Information System (NTMIS) at the center with nodal points in the states, furnishes relevant manpower information for technical education planning. In the states, State Departments/Directorates/Boards of Technical Education are responsible for the planning, management, administration and funding of technical education.

FINANCING

8. The financing of technical education is undertaken by both the Center and the States under two heads: Non-Plan and Plan expenditures. Non-Plan expenditures cover on-going programs and existing institutions, while Plan expenditures are incurred on new projects/schemes which are funded during the Five-Year Plan period. Many Plan schemes continue after five years and thus become non-plan programs. The financing of education by the Center and States by level under the First through Sixth Five-Year Plan is shown in attached Table 2. The Central Government finances technical education under two major areas: central institutions and Central Intervention Schemes, and

has over the previous six Five-Year Plans allocated about 12% of education resources to technical education.

CENTRAL FUNDING OF EDUCATION

Educational Level	First Plan	Second Plan	Third Plan	Fourth Plan	Holiday Plan	Fifth Plan	Sixth Plan
	Rs. Millions						
Total General	133	224	848	241	697	1092	2247
	(87)	(82)	(79)	(75)	(85)	(85)	(89)
Technical	20	49	125	81	125	156	278
	(13)	(10)	(21)	(25)	(15)	(12)	(11)
Grand Total	153	273	589	322	823	1285	2524
	(100)	(100)	(100)	(100)	(100)	(100)	(100)

Note: Figures in brackets are percentages to total.

9. The Center finances a number of national level institutes including the 5 IITs, 17 RECs, 4 Indian Institutes of Management (IIMs), School of Planning and Architecture, National Institute of Foundry and Forge Technology. National Institute of Training in Industrial Engineering (NITIE), the 4 TTTIs, the International Center for Science and Technology Education (ICSTE), the North Eastern Regional Institute of Science and Technology, the Indian Institute of Technology in Assam, and the Longowal Institute of Technology and Engineering in Punjab.

10. GOI also funds a number of programs for quality improvement and consolidation of the system operated by the States. Central Assistance Schemes include the following:

(a) Community Polytechnics;
(b) Modernization and removal of obsolescence;
(c) Establishment of Quality Improvement Centers;
(d) Vocational Education;
(e) Post-Graduate Programs and Research;
(f) Computerization and the development of computer technology;
(g) Technical education in the Universities and Apprenticeship training of Engineering graduates and Diploma Holders;
(h) Expansion of facilities in the areas of weakness; and
(i) Creation of infrastructure in emerging technology areas.

11. State financing of technical education includes the whole or part financing of RECs and Polytechnics. In the case of RECs, the states cover 50% of recurring expenditures and provide land and other amenities. The other costs are borne by GOI. The States are fully responsible for the

Polytechnics, and also finance privately managed and approved Engineering Colleges and Polytechnics at levels varying from 75% to 95% of recurring expenditure.

12. About 20% of the students who enroll in Polytechnics and RECs receive stipends and fellowships. All students from scheduled castes and backward tribes receive free education as well as followships. All Post-Graduate students and Doctoral candidates are provided with fellowships. The average expenditure by a student on boarding and lodging is about Rs.300 per month for Polytechnics and Rs. 500 per month for RECs.

EMPLOYMENT

13. It is estimated that about 27% of technicians and engineering graduates find employment in the public sector undertaking, 38% in the private sector, 23% in State Governments and local bodies; 5% in the Central Government and the remainder in other areas. About 73% of graduates typically find employment in Government, while only 17% go into manufacturing, 9.6% in Electricity and Gas, and 0.4% in repair and maintenance.

EMPLOYMENT DETAILS OF ENGINEERS AND TECHNICIANS

Institution	% employed (Total)	% employed in Public Sector	%employed in Private Sector	Others including Self-employed
Regional Engg. Colleges	85-90	30-35	25-30	30-35
Other Engg. Colleges	75-80	20-25	20-25	25-30
Polytechnics	55-60	20-25	20-25	25-30

Note: A large number is employed in the unorganized sector, in small scale industries and in countries outside India. The exact details of these are not available.

Table 1: Center and State Plan Outlays for Education During Five Year Plans

	CENTER			STATES		
Plan	All Sectors	Education	% Education to All Sectors	All Sectors	Education	% Education to All Sectors
	-- Rs. Millions ---			-- Rs. Millions --		
I	899	44	4.9	1457	126	8.6
II	2559	70	2.7	2241	207	9.2
III	3600	148	4.1	3900	412	10.6
IV	8871	271	3.1	7031	551	7.8
V	20437	405	2.0	18866	800	4.2
VI	47250	735	1.6	50250	1789	3.6

Table 2: Intra-Sectoral Resource Allocation for Education in India during Plan Periods

Educational Level	First Plan	Second Plan	Third Plan	Fourth Plan	Plan Holiday	Fifth Plan	Sixth Plan
Elementary *	85	95	178	65	235	410	906
	(56)	(35)	(30)	(200)	(29)	(32)	(36)
Secondary	20	51	103	53	118	250	398
	(13)	(19)	(18)	(16)	(14)	(19)	(16)
University	14	48	87	77	184	292	486
	(13)	(19)	(18)	(16)	(14)	(19)	(16)
Other (General) **	14	48	87	77	184	292	486
	(13)	(19)	(18)	(16)	(14)	(19)	(16)

* including pre-school education.
** including teacher, education social education (youth services), cultural programs, etc.

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Problems and Issues in Technical Education

Introduction

1. Despite the impressive growth and diversification which the technical education system in India has undergone in the past four decades, it still suffers from a variety of problems which are directly related to and affect its capacity to respond to the changing needs in the society, the quality of graduates which it produces, and the efficiency with which it is operated.

Capacity

2. As the industrial modernization process increases in momentum in India, the emphasis in production is shifting from the older labor-intensive industries to ones requiring more skill-oriented manpower. Technical skills in new areas and familiarity with new methods of technology are becoming increasingly important. There is consensus in India today that the country needs two distinct types of technical personnel at the diploma level to respond to these changes: these are the Technician and the Technician-Engineer. This would be in keeping with industrial developments, training, and employment patterns in the advanced and middle-income countries.

3. Given the requirements for these different types of workers and the emerging demand for a wide variety of diversified and specialized occupations, the Polytechnics are not as yet capable of fully responding to these needs. For example, 80% of the Polytechnics offer only the conventional courses in civil, mechanical, and electrical engineering, while only 20% offer some form of diversified program. Only 11 Polytechnics offer Advanced Technician Diploma programs, which are designed to produce the Technician-Engineer. The Emerging Areas where programs are required but are not yet underway include non-conventional energy including bio-gas conversion and gasification of fuels, environmental engineering, bio-technology, communication and information processing, computer-aided design and manufacturing (CAD/CAM), fiber optics, microprocessors, oceanography, vacuum technology and cryogenics.

4. A second problem, which is directly related to the system's capacity to respond to changing needs, is the rigidity in the structure of various diploma programs. In India, as in most countries, there is the formal institution-based diploma program. However, the need for a highly flexible system where students can gain entry and reentry through part-time, day and/or block-release programs is a necessity. The Diploma course is of three-year duration for all courses and all students, despite the fact that some come with 12 years of basic education from the school system or are Industrial Training Institute (ITI) graduates. Gujarat has introduced the Multi-point Entry and Credit System which is explained in more detail in **Annex 10**. The eight States participating in the First Technician Education Project will also gradually introduce this system in selected Polytechnics. About 25% of the existing Polytechnics offer part-time diploma programs of eight-semesters duration. Most of these are in conventional subjects and the same as the regular

program. The need for introducing flexibility into the technician education system and developing responsive continuing education programs is clear. This is particularly obvious when it is noted that there is a stock of about one million engineers and technicians who require updating and retraining to meet the changing needs of industry and the modern sectors.

5. While the technical education system has concentrated on producing workers for the organized sector, about 75% of the population live in rural areas and are engaged in activities in the so-called "unorganized" sector. There is a need therefore for technical education institutions to respond in some way to this prevalent pattern of employment by offering relevant programs. Of the 467 Government Polytechnics, 129 of them have undertaken programs which address some rural development problems. Typically, these Polytechnics offer short courses which are responsive to local needs and they act as "service" centers for rural artisans and entrepreneurs. These "Community Polytechnics" are the only real response to date to this need and demand.

6. While women constitute about 50% of the population, their participation in technician education is low. Only 40 out of about 240 Polytechnics in the proposed project States offer courses to women, and only 14% of enrollment in Polytechnics are women. The courses which are offered tend to be traditional and do not facilitate the participation of women in modern sector wage employment. One of the major obstacles to female enrollment is the lack of separate residential accommodation at the Polytechnics. It has also been suggested that few women seek admission to coeducational programs, preferring instead to enroll in exclusively female institutions.

Quality

7. Although many of the technical education institutions such as the Indian Institutes of Technology (IITs) turn out students who are in demand both domestically and internationally, the quality of training is poor in the Polytechnics. The most prominent reason for this is a teaching force which lacks adequate pedagogical training as well as industrial experience. The system has been unable to attract and sustain the motivation of teachers because of non-competitive pay scales and other amenities of which the provision of housing is critically important. Hence, about 30% of teaching positions at the Polytechnics remain vacant.

8. Of the 15,000 teachers in the Polytechnics, only 2,000 have undergone formal teacher training, and only another 4,500 some type of short duration training course. With the need to expand programs in new areas, it is estimated that about 10,000 teachers have to be trained in long-term programs and another 6,000 in updating courses. The Technical Teacher Training Institutes (TTTIs) have so far been able to train only about 20% of the existing stock of Polytechnic teachers. Their capacity would have to be doubled to meet a part of the demand for institutional training, as well as for them to organize other distance education programs. Industrial training facilities are rarely utilized for training faculty, and specialized programs to train faculty in educational technology, curriculum development, preparation of training aids, media design, testing, and evaluation and planning, do not exist at the State level.

9. A major factor which emerges from this lack of formal content updating, training in pedagogic skills, and industrial experience, is that teachers revert to "chalk and talk" teaching practices. The majority of teachers have been unable to introduce instructional strategies such as student-centered and resource-based learning because of the lack of instructional (hard and software) materials, particularly a variety of media including television and computers. Computers are seen as especially important in the training of engineers and technicians. The lack of print/non-print materials, reprographic facilities, and books and journals in functioning libraries when combined with limited teacher training, lower the standard of instruction and the quality of trainees who graduate from these institutions.

10. The limited flexibility and course selection in the Diploma program is reflected in the curriculum. While the TTTIs and State Boards of Technical Education are charged with the task of assisting the Polytechnics with important tasks like the systematic reappraisal of teaching technology, development of teaching aids, and learning resources materials, student evaluation, preparation of teaching manuals and the training of teachers in educational technologies, little has been done in the past. Both the TTTIs and the Boards of Technical Education are being strengthened in the First Technician Education Project to be Regional and State-level Resource Centers respectively.

11. The quality of the system is also affected by the equipment and facilities available for teaching, as well as the learning environment. Over the years, obsolescence of equipment and instructional facilities have assumed enormous proportions at the Polytechnics. About 60% of the Polytechnics were established two or three decades ago, hence much of the equipment and laboratories are not only outdated but unserviceable. The "standard equipment lists" which were prepared twenty-five years ago need replacing not only because of age, but because of changing syllabi, introduction of new courses, and the use of different equipment in industry. Laboratories in particular need modernization, as it would be especially difficult to correlate theoretical courses with experimental work in the absence of up-to-date modern facilities. The need for computers and electronic instrumentation is also evident. Only 10% of the Polytechnics have computer facilities. Hostels and staff housing at the Polytechnics are totally inadequate.

Efficiency

12. The technical education system needs considerable strengthening to improve its internal and external efficiency. At present systematic planning is hampered by the lack of relevant, meaningful and reliable information about the internal and external efficiency of the system and for decision making at the right levels at the right time. For example, the National Technical Manpower Information System 1/ only covers occupations by categories and quantitative information on broad areas of supply and demand. It does not take into account changing job profiles and income patterns. As important, there is no organized system for evaluating on a continuing basis the demand by industry for Polytechnic graduates, for diversification and phasing out of

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1/ SAR, India: Technician Education Project, Report No.8384-IN, Annex 7.

on-going programs, and for the introduction of new programs in emerging technologies. The Institute for Applied Manpower Research (IAMR) is the lead Center in the NTMIS, but performance both at the IAMR and at the nodal centers in the States needs support. What is needed is to link the NTMIS to a broader computerized management information system. This problem is being addressed in the First Technician Education Project.

13. **Employment and External Efficiency**. India has the third largest pool of technicians in the world. Different data sources suggest that manufacturing jobs increased at a much slower pace in the 1980s than in the 1970s, despite a sharp rise in industrial growth. This was a result of increased capital intensity brought about by a policy environment which discouraged job creation. Given the need for India to generate productive employment in the next few decades, new industrial labor strategies and policies are necessary. 2/ Assuming that industrial growth, especially in the manufacturing sector will continue apace in the foreseeable future, a shift is needed from the present practice of preserving employment and upgrading existing jobs in existing firms, to an aggressive policy of promoting substantial employment growth in order to insure that higher growth is translated into higher labor demands.

14. Since the mid 1950s, India has made significant efforts in policy reforms as evidenced by the Industries (Development and Regulation) Act of 1951 and the Second Industrial Policy Resolution in 1956. Although these reforms have resulted in significant overall output and investment growth, there is still insufficient technological progress in a large number of subsectors. 3/ For future industrial expansion, India should take advantage of three sectors, industrial electronics, computers and data processing, and telecommunications, which are less penalized by the industrial environment than other areas of activity and which in addition, thrive on intensive use of skilled manpower.

15. Graduates of Polytechnics are primarily employed at the skilled technician level or as supervisors for semi-skilled and unskilled workers. Because of the dearth of employment at this level, diploma graduates have been known to accept jobs which require far lower qualifications, resulting in underemployment. At present, 40% of Polytechnic graduates are employed in the organized sector where limited employment growth has pushed up wages and other labor costs as compared to the unorganized sector. 4/

16. Data analyzed on the demand for and supply of technicians at the all-India level and by engineering specialty show that there has been an over-

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2/ World Bank, India: Poverty, Employment and Social Services, Country Economic Memorandum, Report No. 7617-IN, February 2, 1989.

3/ World Bank, India: Policies for Industrial Technology Development, Report No. 6715-IN, May 11, 1987.

4/ The unorganized sector includes household establishments and small-scale establishments with less than ten workers and power, or less than 20 workers and no power.

supply in civil engineering since the late 1970s. 5/ If no policy intervention is initiated, this situation will result in a cumulative surplus of over 85,000 civil engineering technicians by the year 1995/96. Although there is at present an oversupply of mechanical engineers, it is expected that the economic growth rate of about 5% predicted for the Eighth (1990-94) Plan will absorb this excess up to the year 1992/93 after which there could be an undersupply. In the case of electrical engineers, demand is expected to exceed supply by 1990/91 with a cumulative gap of over 51,000 by 1995/96. For chemical, metallurgical and electronics engineering technicians, demand has already exceeded supply in the region of 1,500, 5,000, and 6,000 respectively for the year 1988/89. If the GOI's industrial policy is to move rapidly into emerging technology areas, i.e., electronics, computers and data processing, and telecommunications, and is to succeed, the out-turn of graduates in these disciplines will have to be increased as soon as possible.

17. In order to close the gap between the demand for and supply of technicians, there are three fundamental areas which must be addressed in the coming decade. These are to: (a) plan the supply of technicians by engineering specialty to meet the needs of new technology industries and the unorganized sector; (b) curtail oversupply in disciplines which are saturated; and (c) provide incentives and opportunities to industries which disseminate modern technologies which are labor intensive and those where India has a competitive advantage.

18. For the above policies to work, the linkages between industry and Polytechnics which are presently weak, need considerable improvement. These linkages are being strengthened in the eight States participating in the First Technician Education Project. Industry sometimes considers Polytechnics graduates too theoretical for immediate employment. Technical education institutions sometimes do not sufficiently appreciate that developing the technical skills and knowledge of students to participate in industrial production is their main function. Interaction with the community, professional societies, and amongst institutions is also not very strong. Polytechnics tend to operate in isolation and major efforts will be required to get programs to be more relevant to the needs of industry. In such an environment, internal as well as external efficiency will remain low, contributing to unfavorable performance and high costs per graduate. A system which is not well integrated with industry and not delivering the right product, needs substantial revision and changes. The Community Polytechnics, of which there are 129, provide some links to the rural and informal sector.

19. While dropouts are not a major problem, repetition is more prevalent in the system. Since admission to Polytechnics is usually on the basis of merit, the relatively better students gain admission and dropouts are low. The largest number of dropouts is normally in the first year and is generally due to students transferring to better institutions. Even in the private institutions where students of relatively lower merit are admitted, dropout rates are not very high. Students here pay high capitation fees for admission and are guaranteed graduation. The highest dropout rate is seen among scheduled caste and tribe students. In post-graduate courses, the dropout

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5/ SAR, India: Technician Education Project, Report No.8384-IN, Annex 8.

rates range between 30% and 60%, but this is due in large part to candidates gaining employment.

20. The **examination system** requires change and a rational student performance assessment system needs to be developed. The results of a recent examination of 700 first-year Polytechnic students at the end of the first semester revealed that only 29% were successful in the entire examination. Further, from a sample of 251 students entering three-year courses in two Polytechnics, only 46% successfully completed their Diploma in the prescribed time. In some cases, examinations do not fairly reflect the curriculum. In other cases, standards which are set for passing are unreasonably high. The unrestricted "carry-over" reduces the motivation of students and burdens teachers with groups of students with an unreasonably wide range of achievement. It would be appropriate to revise and publish comprehensive guides for examiners on the setting, marking and moderating of question papers as is done by the City Guilds of London which is the examining body in technical education in the United Kingdom.

21. More than dropouts and repeaters, it is the disinterested student who poses a serious problem in the system. Student indiscipline has increased in recent years, and this has a relationship to the nonacademic environment, poor instructors, postponement of examinations, unemployment of graduates, and political interference in the activities of these institutions. Absence of proper guidance and counselling services and indifference toward the community have aggravated the problem. Guidance and counselling services in an organized form are absent in most institutions. Placement services should be provided by a Placement Officer, but in most institutions this position does not exist or is unfilled. Even campus interviews with potential employers are not arranged by all the institutes.

22. The organizations and institutions which operate the system need strengthening if the efficiency is to be improved. The Bureau of Technical Education (BTE) and its four regional offices need assistance. The work load of the BTE has increased, particularly its role as the Secretariat to the AICTE, but this has not been accompanied by the necessary expansion of staff. The State Directorates and Boards of Technical Education are mainly concerned with administration. Typically, the Directorates have no professional units for promoting industry-institute linkages, Community Polytechnics, employment planning and curriculum development. The Boards are concerned only with conducting examinations but need to be involved in curriculum development and review. With the mushrooming of private technical institutions, there is also a need to maintain performance standards. A system of approval/sanction, recognition and ultimate accreditation is now in its infancy. At the institutional level, efficiency can be improved when Polytechnics are autonomous in financial, administrative and academic matters. By the completion of the First Technician Education Project, a total of 49 Polytechnics will enjoy some degree of autonomy.

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INDIA

SECOND TECHNICIAN EDUCATION PROJECT

The Ten-Year (1990-99) Technician Education Investment Program

OBJECTIVE: COMPONENT/ACTIVITY	8th Five Year Plan (1990-94) Rs.	8th Five Year Plan (1990-94) US$	9th Five Year Plan (1995-99) Rs.	9th Five Year Plan (1995-99) US$	Total (1990-99) Rs.	Total (1990-99) US$
	---Million---					
CAPACITY EXPANSION:						
New Technology Programs						
- Introduce 80 New Diploma programs and 100 Advanced Technician Diploma programs	1215.1	72.8	1413.0	84.6	2628.1	157.4
- Develop 16 new Polytechnics	1726.9	103.4	2108.9	126.3	3835.8	229.7
Continuing Education Programs:						
- Establish 20 Continuing Education Centers in the State Boards of Technical Education	37.5	2.2	62.5	3.7	100.0	5.9
- Establish 100 Departments of Continuing Education	464.5	27.8	664.5	39.8	1129.0	67.6
Rural and Informal Sector Programs						
- Expand community Polytechnic system	341.0	20.4	461.0	27.6	802.0	48.0
- Establish 4 Special Institutions of Appropriate Technology	523.0	31.3	142.0	8.5	665.0	39.8
- Undertake 4 experimental projects for the application of science and technology to rural development	91.4	5.5	2.6	0.2	94.0	5.7
Women and Handicapped Programs						
- Establish 25 residential women's Polytechnics	1269.6	76.0	1613.2	96.6	2882.8	172.6
- Establish 10 Departments of Technical Education for the handicapped	92.2	5.5	92.2	5.5	184.4	11.0
Student and Faculty Housing Programs						
- Construct hostels for 20,000 boys and 10,000 girls, and houses for 7,600 teachers	1841.1	110.2	892.5	53.4	2733.6	163.6

ANNEX 5
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OBJECTIVE: COMPONENT/ACTIVITY	8th Five Year Plan (1990-94) Rs.	US$	9th Five Year Plan (1995-99) Rs.	US$	Total (1990-99) Rs.	US$
			Million			
QUALITY IMPROVEMENT:						
Teacher Education and Training Programs						
- Strengthen 4 Technical Teachers's Training Institutes.	506.5	30.3	384.8	23.8	891.3	53.3
Curriculum Development and Research Programs						
- Establish Curriculum Development Centers in 25 states Boards of Technical Education	129.0	7.7	134.0	8.0	263.0	15.7
Equipment and Facility Improvement Programs						
- Modernize equipment in 467 Polytechnic	4856.4	29.1	1338.7	80.1	6195.1	109.2
EFFICIENCY IMPROVEMENT:						
Internal Efficiency Programs						
- Strengthening the management system by a) establishing All India Board of studies for Continuing Education; b) strengthening the All India Board of Technical Education; c) establishing a computerized management information system; and d) giving academic autonomy to a limited number of Polytechnics	214.2	12.8	234.3	14.0	448.5	26.8
External Efficiency Programs						
- Expand & strengthen the National Technical Manpower Information System	148.7	8.9	159.9	9.4	305.6	8.3
- Establish a National Board of Accreditation	19.4	1.2	23.3	1.4	42.7	2.6
BASE COSTS	13385.8	801.5	9815.1	587.7	23200.9	1389.2
Contingencies						
Physical (9.8%)	1311.8	78.6	942.2	56.4	2254.0	135.0
Price (16%)	2351.6	140.8	3334.8	199.7	5686.4	340.5
Sub total	3663.4	219.4	4277.0	256.1	7940.4	475.5
Total Costs	17049.2	1020.9	14092.1	843.8	31141.3	1864.7

ANNEX 6

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Present Fee Structure at Polytechnics in Project States

State	Existing Annaul Fee Structure				Annual Operational Cost per student	% of cost covered by student Fees
	Tuition	Boarding	Other	Total		
Andhra Pradesh	72.00	150.00	-	222.00	5500.00	4%
Assam	120.00	103.00	108.00	331.00	10500.00	3.3%
Haryana Govt.	180.00	300.00	336.00	816.00	8537.00	9.9%
Himachal Pradesh	Nil	120.00	540.00	660.00	12500.00	5.8%
Maharashtra	200.00	3600.00	200.00	4000.00	6500.00	2.7%
Punjab	Nil	75.00	Nil	75.00	8800.00	0.4%
West Bengal	144.00	144.00	20.00	164.00	7000.00	2.3%
Delhi	*100.00	180.00	171.00	451.00	7130.00	2.7%
Tamil Nadu	180.00	-	40.00	220.00	6000.00	4%

Source: State Directorate of Technical Education

* In girls polytechnics, tuition fee is Rs.50/- p.a.
No tuition fee charged from SC/ST and scholarship holders.

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Criteria for Selection of States Developed by Government of India

1. For the World Bank-assisted project for development of technician education, the States are to be selected by applying two sets of criteria. The first set of criteria (A) will be applied to assess the performance of the State in the field of polytechnic education on the basis of broad performance parameters. The second set of criteria (B) would necessiate a degree of commitment of each State to fulfil specified actions.

2. Criteria A:

(a) The capacity of the States to provide the necessary resources during the project period and to continue at the same level after the project is completed. This will be judged from the level of resource provision for technician education in the past;

(b) The preparedness of the States to undertake the project. The State's short term and long term planning strategies, the preparation they have made for the implementation of programs in the thrust area of national policy, and the mechanisms created for these purposes at the Directorate, State Board and at the institution level would be the basis for assessing such preparedness;

(c) States whose performance in the development of technician education have been consistently good would be preferred;

(d) States which have been highly effective in managing the polytechnic education system would be selected for participation in the project.

(e) The extent to which the State has ensured compliance with norms and standards by the institutions in the State. The institutions should also have consistently maintained high level of academic standards;

(f) The degree of interaction with the industry and the linkages established by the faculty and students;

(g) The effectiveness of resource allocation and the extent to which Polytechnics have been able to generate resources;

(h) The backwardness of the State from a socio-economic point of view;

(i) The Polytechnics in the State should have demonstrated a high level of capability and innovativeness and should have engaged themselves in purposeful innovative projects for improving the quality of technician education;

(j) The efforts initiated at the State level to implement the national policy on technical education and the action taken so far within the polytechnic system; and

(k) The degree to which the State has been able to plan staff development in an integrated manner and the extent to which such plans are implemented for the improvement of teacher performance in polytechnics.

2. Criteria B:

Each state participating in the project will have to give a commitment to fulfil the following conditions;

(a) provide budgetary allocations for effective maintenance of equipment and facilities;

(b) make appropriate budget allocations to meet the matching fund formula for receipt of Central Assistance;

(c) systematically fill all sanctioned instructor/teacher posts;

(d) sponsor staff for initial and in-service training;

(e) undertake curriculum revision, periodically at least once in 5 years;

(f) gradually and systematically introduce autonomy in Polytechnics;

(g) introduce flexibility in program structures in a phased manner; and

(h) introduce examination reforms and maintain academic standards.

ANNEX 8

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Detailed Project Components by State

COMPONENTS	ANDHRA PRADESH	ASSAM	HARYANA	HIMACHAL PRADESH	MAHARASHTRA	PUNJAB	TAMIL NADU	WEST BENGAL	DELHI	TOTAL
Capacity Expansion										
New Diploma Courses	14	2	16	4	40	12	41	14	12	57 a/
New Post Diploma Courses	2	-	1	3	22	-	12	5	5	32 a/
New Co-ed Polytechnics	1	-	3	1	1	-	-	2	1	9
Continuing Education Centres & Departments	-	1	1	1	17	6	12	4	5	47
Community Polytechnics	6	5	-	-	26	7	-	7	3	54
Residential Polytechnics	1	1	1	-	2	3	-	1	-	9
- Wings for women in co-ed Polytechnics	1	-	-	-	5	-	-	-	-	6
Hostels/Residences										
- Places for Boys	225	-	825	280	1200	330	-	1725	40	4625
- Places for Women	2958	240	730	230	600	240	1200	790	20	7008
- Faculty Houses	161	-	281	63	200	120	-	161	40	1026
- Staff Quarters	118	-	85	75	-	55	80	401	-	814
Quality Improvements										
Modernizing Labs and Workshops (no. of Polys.	56	8	12	4	43	14	36	30	8	211
Staff Development Centers	-	1	1	-	6	1	1	-	-	10
Staff Development Cells	-	-	-	-	22	19	-	1	-	42
Computer Centers	56	9	16	5	52	12	25	10	3	188
Introduction of Flexibility (Multi-Point Entry & Credit System)	5	7	1	1	7	1	10	1	2	35
Curriculum Development Centers	1	1	1	1	7	1	1	1	1	15
Learning Resource Development Centres	-	1	1	1	8	-	1	1	1	14
Learning Resource Utilization Cells	3	9	15	5	55	-	55	34	9	185
Faculty Development (No. of Teachers)	330	253	392	120	1200	517	1955	789	789	5803
Efficiency Improvement										
State PIU/Directorate/ SBTE/CPC										
- Key Additional Staff	27	10	44	18	59	25	67	37	14	301
Industry-Institution Interation.										
- Central/Regional Cells	1	1	1	1	10	1	1	1	1	18
- Polytechnic Cells	56	8	16	5	18	19	55	34	9	220
Autonomous Polytechnics	5	-	-	1	7	-	10	2	-	26
Maintenance Cells										
- Central/Regional Level	4	1	1	-	3	1	1	1	-	12
- Polytechnic Level	8	8	16	5	52	12	55	34	6	196

a/ Different types of courses (Numbers by State will not add to total).

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Summary of New and Emerging Technology Courses to be Offered in Project Institutions

Table 1: Diploma Course

	AP	AS	KA	HP	MA	PU	TN	WB	DE	TOTAL
Un dent fied Courses for Women					5					5
Agriculture & Food										
Agricultral Engineering								1		1
Fishery								1		1
Plantation & Forestry Engineering							1			1
Sericulture	2									2
Sugar Technology					1					1
Chemical Engineering										
Chemical Engineering (Fertilizer)	1									1
Chemical Engineering (Petrochemical)	1				1					2
Chemical Engineering (Plastic & Polymer)	1				2					3
Chemical Technology & Engineering	1							1	1	3
Plastic Technology			2		2		1		2	7
Civil Engineering										
Architectural Assistantship			2			2	1	4		9
Civil Engineering (Construction)									1	1
Civil Engineering & Architecture							8			8
Electrical, Electronics & Computer										
CAD Civil, Electrical & Mechanical						4				4
Cinematography & Sound Engineering	1				4	1				6
Computer Application						1				1
Computer Science & Engineering	9		5	1	12	5	8	5	1	46
Electrical Engineering			1					1		2
Electrical & Electronics Engineering							1			1
Electrical Instruments & Control							1			1
Electronics		1			5					6
Electronics & Communication Engineering	4		6	1		4	5		1	21
Electronics & Instrumentation	7						7			14
Electronics & Telecommunication					7			9		16
Industrial Electronics & Instrumentation			1							1
Instrumentation & Control									1	1
Instrumentation Technology			1	1		1	3	5		11
Medical Electronics					2	1				3
Fashion, Design, Textiles & Leather										
Commercial Arts & Industrial Design			1							1
Dress Designing & Garment Manufacturing					4					4
Fashion Technology & Textile Design						1			1	2
Footwear Technology & Manufacturing	1				1					2
Garment Fabrication Technology									1	1
Knitting Technology							1			1
Textile Design		1	1		1	3	2			8
Textile Processing			1							1
Textile Technology (Spinning & Weaving)			1							1
Mechanical										
Automobile Engineering	3							3		6
Maintenance Engineering			1			1			1	3
Marine Engineering							1	1		2
Mechanical Engineering			2						1	3
Mechanical Engg & Production Technology							4			4
Mechanical Design & Drafting							1			1
Metallurgy	1				1					2
Mining Engineering	3									3
Production Engineering								1		1
Refrigeration & Airconditioning							1			1
Medical & Health										
Bio-Medical Engineering	1									1
Environmental Engineering & Public Health									1	1
Pharmacy				2				3	1	6
Others - Non-Engineering										
Ceramics			1							1
Office Management			1					1		2
Packaging Technology			1		1					2
Photography								1		1
Printing Technology							1			1
Secretarial Practice					2					2
Travel & Tourism			1							1
Total Number of Courses	36	2	28	5	39	23	47	37	13	228
Total Number of Types of Courses	14	2	16	4	13	12	16	14	12	57

Medical Engg.
Micro Processor

Table 2: Post Diploma Courses

	AP	AS	HA	HP	MA	PU	TN	WB	DE	TOTAL
Electronics & Computer										
Advanced Manufacturing Technology									1	1
CAD/CAM					1					1
Computer Application				1	4		3	9	1	18
Fiber Optics					1					1
Information Technology					1					1
Medical Electronics								1		1
Microprocessor Technology			1		1					2
Mining Electronics								1		1
Robotics & Automation					1					1
Satellite Technology					1					1
Telematics					1					1
TV & Video Technology					1					1
Mechanical										
Automobile Technology & Engineering							1			1
Foundry Technology					2			1		3
Industrial Engineering					1				2	2
Offshore Engineering					1					1
Refrigeration & Airconditioning					1					1
Sea-Bed Mining					1					1
Tool & Die Making							1			1
Tool Engineering					1					1
Others										
Bio-Technology							1			1
Cement Technology	2									2
Entrepreneurship Development				1						1
Environmental Engineering							1			1
Interior Design & Model Making Practice							1			1
Knitting & Garment Technology							1			1
Man-Made Textile					1		1			2
Petro Chemical Engineering								1	1	2
Printing & Packaging									1	1
Paper Technology	1				1					2
Rural Technology				1						1
Textile Design							1			1
Total Number of Courses	3	-	1	3	19	-	10	13	6	55
Total Number of Types of Courses	2	-	1	3	15	-	8	5	5	32

Table 3: New Technology and Additional Diploma Courses by State

State	DW	PDW	DCE	PDCE	Total Courses	Total Places 1/
Andra Pradesh	12	-	24	3	39	4,230
Assam	2	-	-	-	2	180
Haryana	8	-	14	1	23	1,905
Himachal Pradesh	1	-	4	3	8	120
Maharashtra	14	1	26	19	60	3,185
Punjab	12	-	13	-	25	2,800
Tamil Nadu	14	1	27	11	63	5,210
West Bengal	11	3	28	11	53	2,530
Delhi	3	-	10	6	19	1,300
Grand Total	77	5	146	54	272	21,460

DW = Diploma Course/Women

PDW = Post Diploma Course/Women

DCE = Diploma Courses/Coeducational

PDCE= Post Diploma Course, coeducational

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

New Coeducational Polytechnics by State

	AP	AS	MA	MP	MA	PU	TN	WB	DE	Total
Number of Existing Local Polytechnics	42	7	11	3	48	14	45	30	6	206
Number to be established	1	-	3	1	1	-	-	2	1	9
Number of New Diploma Courses	3	-	16	3	40	9	4	4	5	84
Number of Diploma Student Places	450	-	1170	135	2805	1270	360	300	450	6940
Number of New Post Diploma Courses	-	-	1	1	19	-	-	1	2	24
Number of Post Diploma Student Places	-	-	30	30	380	-	-	60	30	530
Number of Total Additional Student Places	450	-	1170	165	3185	1270	360	360	480	7440
Teaching Staff Required	31	-	186	28	82	184	36	23	48	618
Workshops/Laboratories Required	7	-	89	16	66	58	12	8	14	270

LIST OF NEW COED POLYTECHNICS AND POLYTECHNICS TO BE STRENGTHENED

Andhra Pradesh

Government Polytechnic, Bellampally

Assam

Haryana

Government Polytechnic, Hissar

Himachal Pradesh

Government Polytechnic, Kangra

Maharashtra

Institute of Petro-Chemical Engineering, Panvel
Government Polytechnic, Thane
Government Polytechnic, Malvan
Government Polytechnic, Alibag
Government Polytechnic, Miraj
Government Polytechnic, Ahmednagar
Government Polytechnic, Jalna
Government Polytechnic, Jintur
Government Polytechnic, Beed
Government Polytechnic, Osmanabad

Maharashtra

Government Polytechnic, Washim
Government Polytechnic, Arvi
Government Polytechnic, Sakoli
Government Polytechnic, Brahmapuri
Government Polytechnic, Gadchiroli
Government Polytechnic, Naskik

West Bengal

Government Polytechnic, Haldia
Government Polytechnic, Rupnarainpur
Government Polytechnic, Raiganj
Government Polytechnic, Contai

Delhi

Government Polytechnic, Papankalan (Dwarka)

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Multi-Point Entry and Credit System

One of the major problems faced by the Polytechnic System is the variety of target groups i.e., 10+, 10+ Technical, 10+ Technical Board Certificate, 12+ Science Stream, 12+ Technical Vocational Stream, all of which, in different proportions join a straight jacket three year program. Except for the 12+ students who are given exemption from taking some courses, all other groups are treated alike irrespective of their entry level.

Rapid technological advancement in the different disciplines necessitates the offering of a wide range of courses of varying durations and different entry requirements for meeting the diverse manpower needs within and across disciplines. The New National Policy in Education, therefore rightly recognises the need for a flexible structure which would allow students to enter the system at different points depending on their entry level, and take the combination of courses that they need, thereby facilitating the production of manpower for a spectrum of technologies and occupations and enhancing the efficiency of the system.

The Proposed Scheme

The Ten-Year Investment Program includes a scheme for the introduction of the flexible system to 30 percent of all polytechnics by the year 1994 and all polytechnics by 1999. The flexible course structure involves students earning a stipulated number of credits for an award of a Diploma. For example, 135 credits each for a Diploma in civil, mechanical and electrical engineering. The number of credits per course is dependent on a formula related to the number of hours of lecture and practical work covered per week. Award of a Diploma in any of the engineering disciplines requires a minimum number of prescribed credits under each category of the following: Foundation courses, Hard Core courses, Soft Core courses, Basic Technology courses, Applied Technology courses and Diversified courses.

Present Status on the Introduction of Flexible Programs in Polytechnics

At present, the only state which is actively working on the introduction of the Multipoint and Credit System for Polytechnics is Gujarat. This program is still in its infancy and will undoubtly face teething problems. However, it is reasonable to expect the scheme in Gujurat to be followed by the other states. In the first Technican Education project the eight project States are planning to introduce the flexible programs in 21 Polytechnics as a start. The ultimate intention is to spread this to as many Polytechnics in the system as possible.

Gujarat has developed the details of teaching schemes for diploma programs in civil, mechanical and electrical engineering, the pre-requisite(s)

for each course, the examination scheme and the semester during which each course will be offered. The scheme necessitates the establishment of a guidance and counselling system (unit) in each polytechnic to enable effective operation of programs based on the new system. Qualified staff at the unit will facilitate choice of courses by the students and furnish other information to teachers, Technical Examination Boards, etc. In addition, each polytechnic will be provided with marginal additional infrastructure, investments and staff needed for the introduction of the system.

The flexible system has several advantages over the present rigid three-year system. 1/ These advantages include the fact that students will experience greater motivation as they will be able to select individual courses according to their interest and aptitude and can complete the Diploma program at a pace commensurate with their achievement level; the system has the potential to absorb larger student populations in required disciplines; course selection can be altered to cater to changing and diversifying manpower needs; and new courses can be introduced to keep students abreast with developments in industry and emerging technologies.

Polytechnics Introducing the Multi-Point Entry and Credit System

Haryana

Government Polytechnic, Ambala City

Himachal Pradesh

Government Polytechnic, Sundernagar

Maharashtra

Government Polytechnic, Pune
Government Polytechnic, Bombay
Government Polytechnic, Aurangabad
St. Xavier Technical Institute, Bombay
Government Polytechnic, Kolhapur
K.J. Somaiya Polytechnic, Bombay
M.H.S.S. Polytechnic, Bombay

Punjab

Thapar Polytechnic, Patiala

1/ SAR, India: Technician Education Project, Report No. 8384-IN of April 3, 1990 (Annex 6).

Tamil Nadu

Tamil Nadu Polytechnic, Madurai
Government Polytechnic for Women, Madras
Murugappa Polytechnic, Sathiamoorthy Nagar
P.S.G. Polytechnic, Coinbatore
Sri Ramakrishna Mission Vidyalaya Polytechnic, Coimbatore
Nachimuthu Polytechnic, Pollachi
Thiagarajar Polytechnic, Salem
Seshasayee Institute of Technology, Tiruchirapalli
Virundhunagar S. Vellaichamy Nadar Polytechnic, Rajapalayam
P.A.C. Ramasamy Raja's Polytechnic, Rajapalayam
Sankar Institute of Polytechnic, Sankar Nagar

Delhi

IVth Boy's Polytechnic, Pusa
Kasturba Polytechnic, Maharani Bagh
Pusa Polytechnica, Pusa

Andhra Pradesh

Government Polytechnic, Hyderabad
J.N. Government Polytechnic, Hyderabad
Government Polytechnica, Vishakhapatnam
Government Polytechnic, Kakinada
Government Polytechnic, Tirupati

Assam

All Polytechnics

West Bengal

R.K. Mission Shilpapith, Belur (autonomous)

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Continuing Education Centers and Departments by State

	AP	AS	HA	HP	MA	PU	TN	WB	DE	Total
Number of Centers to be Established	-	1	1	1	1	1	1	1	-	7
Additional Staff Required	-	1	4	2	4	4	3	4	-	22
Number of Departments to be Established	-	-	-	-	16	5	12	4	5	42
Additional Staff Required	-	-	-	-	16	15	-	-	40	71
Additional Workshops Required	-	-	-	-	16	5	5	-	-	26
Number of Courses to be run per Year	-	8	-	8	80	16	12	10	18	152
Number of Students to be Trained by 1997	-	-	900	300	8200	2500	8000	1200	4000	24520

Continuing Education Departments will be established in the following Polytechnics:

Assam
Assam Engineering Institute, Gauhati
P.O.W Institute, Jorhat
Silcher Polytechnic, Silcher

Haryana
Government Polytechnic, Ambala City
Vaish Technical Institute, Rohtak

Himachal Pradesh
Government Polytechnic, Sundernagar

Maharashtra
Government Polytechnic, Bombay
Government Polytechnic, Pune
Government Polytechnic, Nashik
Government Polytechnic, Aurangabad
Government Polytechnic, Amaravati
Government Polytechnic, Nagpur
V.J. Technical Institute, Bombay (For Textile and Automobile)
Government College of Pharmacy
Maharashtra Institute of Printing Technology, Pune
Institute of Hotel Management and Catering Technology
Cusrow Wadia Institute of Technology, Pune
W.C.E., Sangli
Government Polytechnic, Kolhapur
Government Polytechnic, Solapur
Government Polytechnic, Nanded
Government Polytechnic, Jalgaon

Punjab
Government Polytechnic, Amritsar
Government Polytechnic, Batala
Government Polytechnic, Hoshiarpur
Government Institute of Textile Technology
Thapar Polytechnic, Patiala

Tamil Nadu
Central Polytechnic, Madras
Tamilnadu Polytechnic, Madurai
Government Polytechnic, Coimbatore
Government Polytechnic, Tiruchi
Thanthai Periyar E V R Government Polytechnic, Vellore
Government Polytechnic, Nagercovil
Government Polytechnic, Tuticorin
Government Polytechnic, Krishnagiri
Government Polytechnic, Aranthangi
Government Polytechnic for Women, Madras
Srinivasa Subbaraya Polytechnic, Coimbatore
P.S.G. Polytechnic, Coimbatore
Thiagarajar Polytechnic, Salem
Seshasayee Institute of Technology, Trichy
V.S. Vellaichamy Nadar Polytechnic, Virudhunagar
Nachimuthu Institute of Technology
Valivalam Desikar Polytechnic, Nagapattinam
Sankar Polytechnic Institute, Sankara Nagar
Rajagopal Polytechnic, Gudiyatham
C.N. Polytechnic, Madras
PSG Polytechnic, Coimbatore
Murugappa Polytechnic, Madras
P.A.C. Ramaswamy Raja's Polytechnic, Rajapalyam
D.C. Polytechnic, Swakasi

West Bengal
Engineering Institute for Junior Executive
Calcutta Technical School
Central Calcutta Polytechnic
Jalpaiguri Polytechnic Institute

Delhi
G.B. Pant Polytechnic
Aryabhat Polytechnic
Pusa Polytechnic
Institute of Commercial Practice
Government Polytechnic, Papankalan

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

New Community Polytechnics by State

	AP	AS	HA	HP	MA	PU	TN	WB	DE	Total
Number to be established	6	5	-	-	26	7	-	7	3	54
Instructional Staff Required	6	-	-	-	130	4	-	49	12	201
Workshops/Laboratories Required	-	-	-	-	-	7	-	7	-	14
Number of Students to be Trained Annually	1800	-	-	-	7500	500	-	1120	1000	12520

LIST OF COMMUNITY POLYTECHNICS

Andhra Pradesh
S.V. Government Polytechnic, Tirupathi
Government Polytechnic, Warangal
Government Polytechnic, Viskhapatnam
Government Polytechnic, Nandyal
Government Polytechnic, Vijayawada
Government Polytechnic, Srikakulam

Assam
P.O.W. Institute, Jorhat
Nowgong Polytechnic, Nagaor
Government Polytechnic, Silohar
Dibrugarh Polytechnic, Laboal
Government Polytechnic, Bongaigoan

Maharashtra
Cusrow Wadia Institute of Technology, Pune
Government Polytechnic, Thane
Government Polytechnic, Alibagh
Government Polytechnic, Malvan
Government Polytechnic, Karad
Government Polytechnic, Solapur
Government Polytechnic, Nasik
Government Polytechnic, Ahmednagar
Government Polytechnic, Dhule
Government Polytechnic, Jalna
Government Polytechnic, Osmanabad
Government Polytechnic, Latur
Government Polytechnic, Jintur
Government Polytechnic, Beed
Government Polytechnic, Arvi
Government Polytechnic, Gadchiroli
Government Polytechnic, Sakoli
Government Polytechnic, Amravati
Government Polytechnic, Washim

Maharashtra (cont.)
Agnel Polytechnic, Bombay
Premlilka Vithaldas Polytechnic, Bombay
Institute of Hotel Management & Catering Technology, Pune
Civil & Rural Polytechnic, Gargoti
Government Polytechnic, Yavatmal
Dr. Punjabrao Deshmukh Rural Polytechnic, Amravati
Rural Institute, Wardha

Punjab
Government Polytechnic, Hoshiarpur
Government Polytechnic, Guru Teg Bahadurgarh
Mehar Chand Polytechnic, Jalandhar
Ramgarhia Polytechnic, Phagwara
Guru Nanak Polytechnic, Ludhiana
Thapar Polytechnic, Patiala
The National Institute of Integrated Rural Development & Transfer of Technology, Palahi

West Bengal
Mushidabad Institute of Technology
Coochbehar Polytechnic
Jagadish Ch. Polytechnic
Hooghly Institute of Technology
Contai Polytechnic
Rajganj Polytechnic
Purulia Polytechnic

Delhi
G.B. Pant Polytechnic
Aryabhat Polytechnic
Women's Polytechnic, Maharani Bagh

ANNEX 14

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

New Women's Polytechnics by State

	AP	AS	HA	HP	MA	PU	TN	WB	DE	Total
Number of Existing Polyt.	14	1	8	1	8	2	11	1	2	38
Number of New Polyt.& Wings to be established	2	1	1	-	7	8	-	2	-	16
Number of New Diploma Courses	6	2	4	1	13	10	-	11	-	47
Number of Diploma Student Places	720	180	360	90	1260	1350	-	600	-	4560
Number of New Post Diploma Courses	-	-	-	1	-	-	-	2	-	3
Number of Post Diploma Student Places	-	-	-	30	-	-	-	80	-	110
Number of Total Additional Student Places	720	180	330	120	1260	1350	-	680	-	4640
Instructional Staff Required	64	34	43	8	78	129	-	51	-	407
Workshops/Laboratories Required	16	1	21	4	28	84	-	21	-	175

LIST OF WOMEN'S POLYTECHNICS AND WINGS

Andhra Pradesh
Government Polytechnic for Women, Karimnagar
Government Polytechnic for Women, Srikakalam

Assam
Residential Girls Polytechnic, Golaghat

Haryana
Government Polytechnic for Women, Faridabad

Maharashtra
Government Polytechnic for Women, Latur (Maharathwada)
Government Polytechnic for Women, Yavatmal (Amaravati)
New Women's Wing at Government Polytechnic, Jalgaon
New Women's Wing at Government Polytechnic, Ratnagiri
New Women's Wing at Government Polytechnic, Pune
New Women's Wing at Government Polytechnic, Nagpur
New Women's Wing at Government Polytechnic, Aurangabad

Punjab
Government Polytechnic for Women, Amritsar
Government Polytechnic for Women, Ludhiana
Government Polytechnic for Women, Ropar

West Bengal
Government Women's Polytechnic, Chandernagore Hooghly
Residential Women's Polytechnic, Siliguri

ANNEX 15

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Summary of Civil Works Program by Year

	1992	1993	1994	1995	1996	1997	Total
A. NEW CONSTRUCTION							
1. New Coed Polytechnics	-	-	2	3	2	2	9
2. New Laboratories & Workshop	-	-	60	85	70	55	270
3. Women's Polytechnics	-	-	2	3	2	2	9
4. Women's Laboratories & Workshop	-	-	45	50	60	20	175
5. Maintenance Centers	6	6	-	-	-	-	12
B. EXTENSIONS							
1. Women's Wings in Polytechnics	-	3	2	1	-	-	6
2. Laboratories & Workshops for Existing Courses	-	1200	800	400	-	-	2,400
3. Classrooms, Labs & Workshops for New Courses	200	600	200	100	100	-	1,200
4. Learning Resources Development Centers	4	6	4	-	-	-	14
5. Learning Resources User Cells	75	80	30	-	-	-	185
6. Computer Centers	-	75	34	32	27	20	188
7. Continuing Ed. Centers	1	2	2	2	-	-	7
8. Continuing Ed. Departmts	10	10	10	10	-	-	40
9. Community Polytechnics	10	20	18	6	-	-	54
10. Hostels for Men 1/	-	930	1130	1632	530	403	4,625
11. Hostels for Women 1/	-	1330	1630	2630	830	588	7,008
12. Faculty Houses	-	200	250	300	150	126	1,026
13. Staff Houses	-	165	225	225	126	73	814
14. Maintenance Cells	20	30	40	50	30	26	196

1/ Places.

ANNEX 16

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Additional Places Created in Polytechnics by State

	Existing Polytechnics New Tech.Courses		New Polytech.		Cont.Ed.Pro.	Total
	Women	Co-ed	Women	Co-ed	Co-ed	
Andra Pradesh	660	2,850	720	450	-	4,680
Assam	-	-	180	-	320	500
Haryana	450	750	330	1,170	-	2,700
Himachal Pradesh	30	75	-	165	60	330
Maharashtra	540	1,505	720	480	1,600	4,845
Punjab	585	775	1,350	-	1,500	4,210
Tamil Nadu	1,930	2,800	-	360	1,600	6,690
West Bengal	160	1,554	680	360	840	3,594
Delhi	240	1,060	-	480	1,100	2,880
Grand Total	4,595	11,369	3,980	3,465	7,020	30,429

* Bank Staff estimates.

ANNEX 17

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Teacher Training and Faculty and Staff Development Program

Additional Teachers to be Appointed and Trained by State

State	New Techn. Courses	New Poly. Co-Ed	New Poly. Women	Cont.Ed. Program	Comm. Poly.	Total
Andhra Pradesh	188	32	64	-	6	290
Assam	-	-	34	1	11	46
Haryana	134	129	33	-	-	296
Himachal Pradesh	17	28	8	2	-	47
Maharashtra	112	37	61	20	52	282
Punjab	199	-	129	15	14	357
Tamil Nadu	350	-	-	9	-	359
West Bengal	122	23	51	4	49	249
New Delhi	60	48	-	40	12	160
Grand Total	1,182	297	372	91	144	2,086

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Schedule of Deployment of Key Additional Staff

CENTRAL GOVERNMENT	TOTAL	FY		
		1991	1992	1993
BTE				
Senior Staff	5	3	2	
Assistant Level Staff	4	2	2	
TTTIs				
Profeesors	32	8	8	16
Assistant Professors	80	20	20	40
Lecturers	33	8	8	17

ANDHRA PRADESH	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	5	5					
Directorate of Technical Education							
Professional Staff	4	4					
State Board of Technical Education							
Professional Staff	14	14					
Curriculum Development Center/Depts.							
Professional Staff	4	4					
Polytechnics 1/							
Principals & Instructional Staff	220	-	20	80	80	40	
Womens Polytechnics							
Principals & Instructional Staff	64	-	-	32	32	-	

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

ASSAM	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	3	3					
Directorate of Technical Education							
Professional Staff	3	1	1	1	-	-	-
Curriculum Development Center/Depts.							
Professional Staff	3	1	1	1			
Learning Resource Development Center							
Professional Staff	3	-	2	1	-	-	-
Polytechnics 1/							
Principals & Instructional Staff	24	12	12				
Womens Polytechnics							
Principals & Instructional Staff	21	-	-	2	8	11	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

HARYANA	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	8	4	4				
Directorate of Technical Education							
Professional Staff	15	7	8	-	-	-	-
State Board of Technical Education							
Professional Staff	10	5	5	-	-	-	-
Curriculum Development Center/Depts.							
Professional Staff	7	4	3				
Learning Resource Development Center							
Professional Staff	4	4					
Polytechnics 1/							
Principals & Instructional Staff	180	20	30	40	45	45	-
Womens Polytechnics							
Principals & Instructional Staff	30	-	10	10	10	-	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

HIMACHAL PRADESH	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	3	2	1				
Directorate of Technical Education							
Professional Staff							
State Board of Technical Education							
Professional Staff	3	2	1	-	-	-	-
Curriculum Development Center/Depts.							
Professional Staff	12	2	5	3	2		
Learning Resource Development Center							
Professional Staff							
Polytechnics 1/							
Principals & Instructional Staff	45	4	8	16	17	-	-
Womens Polytechnics							
Principals & Instructional Staff	8	4	2	2	-	-	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

MAHARASHTRA	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff		(Staff of the DTE)					
Directorate of Technical Education							
Professional Staff	29	8	8	8	5		
State Board of Technical Education							
Professional Staff	17	5	5	5	2		
Curriculum Development Center/Depts.							
Professional Staff		Included in SBTE					
Learning Resource Development Center							
Professional Staff	4	1	2	1			
Polytechnics 1/							
Principals & Instructional Staff	282	25	52	52	153	-	-
Womens Polytechnics							
Principals & Instructional Staff	61	10	20	20	11	-	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

PUNJAB	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	5	5					
Directorate of Technical Education							
Professional Staff	12	5	4	3			
State Board of Technical Education							
Professional Staff	8	5	3	-	-	-	-
Curriculum Development Center/Deptt.							
Professional Staff		included in the DTE					
Learning Resource Development Center							
Professional Staff							
Polytechnics 1/							
Principals & Instructional Staff	288	110	110	68	-	-	-
Womens Polytechnics							
Principals & Instructional Staff	129	29	50	50	-	-	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

TAMIL NADU	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff	3	3	-	-	-	-	-
Directorate of Technical Education							
Professional Staff	7	7	-	-	-	-	-
State Board of Technical Education							
Professional Staff	2	2	-	-	-	-	-
Curriculum Development Center/Depts.							
Professional Staff	3	3					
Learning Resource Development Center							
Professional Staff	-	Included in CDC					
Polytechnics 1/							
Principals & Instructional Staff	228	60	90	78	-	-	-
Womens Polytechnics							
Principals & Instructional Staff	90	20	40	30	-	-	-

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

WEST BENGAL	TOTAL	FY 1992	1993	1994	1995	1996	1997
State Project Implementation Unit							
Professional Staff		Included in the DTE					
Directorate of Technical Education							
Professional Staff	27	12	8	4	3	-	-
State Board of Technical Education							
Professional Staff	8	3	2	3	-	-	-
Curriculum Development Center/Depts.							
Professional Staff	2	-	2				
Learning Resource Development Center							
Professional Staff	-	Included in the DTE					
Polytechnics 1/							
Principals & Instructional Staff	249	10	30	60	60	60	29
Womens Polytechnics							
Principals & Instructional Staff	51	-	10	10	10	10	11

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

DELHI (U.T.)	TOTAL	FY 1992	1993	1994	1995	1996	1997
tate Project Implementation Unit							
Professional Staff	2	1	1				
irectorate of Technical Education							
Professional Staff	7	2	2	2	1		
tate Board of Technical Education							
Professional Staff	3	2	1	-	-	-	-
urriculum Development Center/Depts.							
Professional Staff	2	1	1				
earning Resource Development Center							
Professional Staff	-	Included in CDC					
Polytechnics 1/							
Principals & Instructional Staff	48	-	10	10	18	10	
Womens Polytechnics							
Principals & Instructional Staff							

Note: FY92 means Indian Fiscal Year (April 1991-March 1992).

1/ Includes Community and Continuing Education Polytechnics.

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Staff Development Linked to Career Development

A. INTRODUCTION

1. At present there are three major staff-related issues which confront the Technical Education System. These are: (a) how to attract and retain the best talent in the Technical Education System by ensuring career development?; (b) how to train teachers, Heads of Department (HODs), Principals, Directorate and Ministry officials (and other professionals like Educational Technologists, Curriculum Specialists, Educational Planners, etc.) to acquire new knowledge and skills needed to respond to needs in the sector? and (c) how to make them motivated and productive in the system in which they work by improving the working environment?

2. The solution suggested is a **Comprehensive Staff Development Program** which has two sub-components. The first is organizing a program to equip a new recruit from any cadre with the necessary skills from recruitment to retirement. The second is to improve promotion possibilities, fringe benefits and working conditions.

B. TRAINING

3. The areas in which staff have to be educated and trained are: (a) Subject-matter updating/upgrading; (b) Industrial Experience and (c) Professional training. Course curriculum for each cadre would be designed with the appropriate mix of basic core areas according to the role each staff is currently performing, or going to perform in future i.e. higher line functions, staff function, or new responsibilities in the same cadre. While subject matter upgrading and industrial training methods are well understood, the focus here would be on professional training.

4. The training proposed would be conducted in three phases: (a) Initial, (b) induction and (c) In-service Training.

(a) Initial Training is intended to equip the new recruit of any cadre with an organized body of knowledge in the professional field. During this phase, the staff would be equipped with the scientific and technological concepts he is expected to use in his practice. This training could lead to a certificate, diploma, or a degree in the respective field. These can be offered in the form of long term courses (either institution-based, modular or distance education) entirely through self-study.

(b) Induction Training: This is intended to expose the entrant to the current professional practice. Induction will be closely supervised to assist the inductee in interpreting current practices. The inductee will also be exposed to other sub-systems with whose work he is linked. This phase may extend from six months to one year;

(c) In-service Training: This phase would primarily help staff to acquire new core skills and attitudes needed for practicing the profession and integrating them with his/her on-the-job functions.

5. The acquisition of core skills could be acquired through off-the-job training workshops, production workshops and undertaking micro and macro on-the-job developmental projects. These projects would promote the transfer of the acquired knowledge, skills and attitudes and thus the conscious application in the on-the-job activities.

6. Staff Appraisal. All stages of staff development will be accompanied by Staff Performance Appraisal activities. This would be developed in more detail when the curriculum for each cadre is formulated. In the light of the above, the following staff development programs are suggested for professional development for each cadre.

7. For Lecturers Educational Technologist (possessing ME or M.Tech in Engineering), six months of practical training in industry followed by initial education in TTTIs for 1/2 year to obtain a M.Tech (Education) Degree followed by 6 months of induction training, another induction of 6 months to one year in a Polytechnics, Quality Improvement Center (QIC) and State Curriculum Development Center (CDC). In-service training would be then undertaken in Polytechnics to acquire skills in teaching, instructional material development, testing and evaluation, independent study, student guidance and counselling and use in practice through developmental projects.

8. Head of Department HOD/Curriculum Development

The following program is recommended:

Specialist	Location
-Initial Education of 6/9 months in Curriculum Design and Development	TTTI
-Induction in the Polytechnic, State CDC, Student Industrial Training & QIC of the polytechnic (6 months)	Polytechnic, CDC, Industry
-In-service training continuously to acquire skills in Curriculum Design, Development, Implementation evaluation linked to staff appraisal	QIC/TTTI, Extension and Center Polytechnics

9. For Principal Curriculum Specialist - Sr. Organizational Development

-Initial education of 6/9 months in TTTI for institutional Development Program	TTTI
-Induction in the Polytechnic, State CDC, DTE, Industrial Training for 6 months	TTTI Ext.Center State CDC/DTE/QIC/ Polytechnic
-In-service supervised training for one year for	Extension Center

acquiring skill in perspective planning curriculumcoordination management of innovation	QIC/Polytechnic

10. For DTE (Specialist in Education Planning and Management Organizational Development Expert)

-Initial Education for 6/9 months in Educational Planning and Management and Organizational Development.	TTTI
-Induction in STMIS, SCDC, SBTE and TTTI Extension Center QIC to understand practice being followed by each organization.	State DTE/ State CDC/ STMIS/QIC
-Inservice training to acquire skills in futuristic planning for qualitative expansion, qualitative improvement of State level, educational planning, development, implementation and evaluation of educational program.	STMIS, State CDC, TTTI Extn. Center QIC, DTE

11. For Department of Education (DOE)

-Initial Education for 6/9 months in Educational Planning and Management, Educational Statistic Educational Administration, Educational Costing.	TTTI
-Induction in STMIS, SDTE, other Ministry of Finance, Labor	MOF MOGE/L DTE & MOE
-Inservice training for acquiring skills in Educational administration,	TTTI/STMIS/SCDC
Monitoring/Executing Educational programs	SDTE/MOE(T)

12. It should be noted that all the senior members would undergo at least 4-6 months of exposure in a foreign country to study state-of-the-art in the profession in which each is being trained.

C. Career Development

13. Career development will be ensured by providing opportunities for advancement after every interval of 8 to 10 years, so that a person entering the teaching profession will earn at least three promotion in his career. At each level of promotion in the hierarchy, he/she will be prepared for the new post by requiring the staff to undergo training programs (paras 2-12) The staff member's level of performance will be systematically appraised.

14. Where the system is changing fast, there will always be a need for two types of functionaries at each level to preform i.e) line function and staff functions. A Line function is needed to execute the programs as per

established procedures. But since the procedures change frequently, assistance from staff, whose role will be to solve problems required. In the changed situation would be required. This fact may be used to provide promotional avenues for the staff. Each State will have to think of creating such staff positions at each level of hierarchy. In order that the best performer will be rewarded, there will be continuous staff performance appraisal coupled with program and institutional evaluation as already suggested by the Dogra Commission and accepted by the Ministry of Human Resources Development (MHRD).

D. Strategy for Implementation.

15. This scheme will require the establishment of Staff Development Cells in all the polytechnics in the State to facilitate systematic staff development activities. It will also require setting up of Staff Development Cell in the Directorates of Technical Education in order to plan, implement and monitor staff development programs for Polytechnic faculty, Principals and senior officials on the basis of their career development needs.

16. The following description relate to the role of the Staff Development Cells in Polytechnics. They should:

(a) maintain Personnel Information System on all the members of the faculty in the Polytechnic including qualifications, experience, staff development programs attended, staff development needs as identified by staff appraisals,

(b) update the information about staff development needs on a regular basis;

(c) arranging for annual staff appraisals and identify the training needs of faculty.

(d) identify the training needs of personnel involved in the implementation of different schemes;

(e) prepare Career Development Plans for faculty in collaboration with the Staff Development Cells at the State Directorate;

(f) monitoring the redeployment of trained faculty in the Polytechnics to enable effective utilization of the competencies gained them; and

(g) interacting training establishments to ensure implementation of training programs.

17. Staff Development Cells at the Directorate of Technical Education will carry out the following activities:

(a) elicit information on Staff Development needs for individual polytechnics on a continuing basis and maintain an information system on the Polytechnic faculty, Principals, Heads of Departments and senior officials with regard to their career development needs.

(b) draw up plans for faculty staff development programs in which personnel from the Technician Education System will be deputed annually based on requirements as identified by Staff Development cells of Polytechnics.

(c) plan for the Staff Development of the officers of the Directorate and Board of Technical Education in specialized areas like Industrial Liaison, educational management, project management and evaluation, management of innovations, use of computers, staff appraisals, institution evaluation etc., to be carried out within the country or abroad.

(d) maintain information about possible training places in large and medium industries in specialized areas, where polytechnic faculty can be deputed for training.

(e) maintain information about laboratories, industries, training establishments within the country or abroad for faculty training in emerging technology areas.

(f) interact with the Technical Teacher's Training Institute for deputing teachers to long-term programs like Master's Degree in Technical Education, Induction Programs for new teachers and need based industrial training.

(g) arranging with the Technical Teachers' Training Institute, for training programs in special areas like Resource (Media) Development, Evaluation, Educational Research, etc., to meet the needs of schemes under the World Bank project.

(h) liaise with State Engineering Colleges and Universities and industry for deputing teachers to undergo higher education programs in Engineering/Technology/Science/Humanities;

(i) liaise with TTTI and National Project Implementation Unit of the project for identifying training/study visit locations abroad for senior faculty and officials of the State Directorate/Board, who are responsible for the implementation of the project.

(j) monitor the implementation of staff development programs conducted at different locations and to undertake studies to evaluate effectiveness of the staff development programs.

8. Further action by the DTE/MOE. The Directorate of Technical ducation will ensure that all vacant faculty positions are filled up as well s the new positions created under various schemes and 10% additional faculty s provided as a training reserve. This is done in order to enable faculty of olytechnics to undergo different training programs mentioned in the earlier ections.

9. In addition, teachers will be deputed for training programs pecific to different schemes under the project. Fellowships will be provided or study visits for senior faculty and officials of the DTEs and BTEs every ear during the project period, to study specific aspects of management of

technician education, in other countries. Similar staff development programs for supporting staff will be designed and implemented. Linkages will be established with industrial establishments and training organizations to enable staff development activity. The Staff Development Cell at the Directorate will evolve suitable procedures for exchange of information amongst polytechnics, Directorate, Board of Technical Education, AICTE and other agencies involved in the Staff Development Programs. The activity of the Staff Development Cells at the Directorate and the Polytechnics and the Staff Development programs will be revised annually to assess effectiveness and make refinements.

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Industry-Institute Interaction by State

	AP	Assam	Haryana	HP	Maharashtra	Punjab	TN	WB	DE	Total
No. of Polytechnics	56	8	16	4	51	21	55	30	8	249
New Coed Polytechnics	1	-	3	1	1	-	-	2	1	9
New Women's Polytechnics & Wings	2	1	1	-	7	3	-	2	-	16
No. of Industry-Institute (III) Cells in Polytechnics	56	9	16	5	18	19	30	30	9	192
No. of III Cells at Regional Levels in Institutions	-	-	-	-	10	-	-	-	-	10
No. of III Cells at DTEs	1	1	1	1	1	1	1	1	1	9

LIST OF POLYTECHNICS WITH INDUSTRY-INSTITUTE-INTERACTION CELLS

Andhra Pradesh
Govt. Polytechnic, Hyderabad
J. N. Polytechnic, Hyderabad
Andhra Polytechnic, Kakinada
Govt. Polytechnic, Viskhapatnam
Govt. Polytechnic, Mahaboobnagar
S. V. Govt. Polytechnic, Tirupathi
Govt. Polytechnic, Vijayawada
Govt. Polytechnic, Warangal
Govt. Polytechnic, Proddatur
Govt. Polytechnic, Nizamabad
Govt. Polytechnic, Anantapur
M. B. T. S. Govt. Polytechnic, Guntur
Govt. Polytechnic, Nallore
E. S. C. Govt. Polytechnic, Nandyal
Govt. Polytechnic, Srikakulam
Govt. Polytechnic, Gudur
Govt. Polytechnic, Kothagudam

K. D. R. Govt. Polytechnic, Wapparthy
Govt. Polytechnic, Vizianagaram
Govt. Institute of Printing Technology, Secunderabad
Govt. Polytechnic for Women, Kakinada
Govt. Polytechnic for Women, Guntur
Govt. Polytechnic for Women, Warangal
Govt. Polytechnic for Women, Bheemunipatnam
Govt. Polytechnic for Women, Nellore
Govt. Polytechnic, Adilabad
Govt. Model Residential Polytechnic, Bhadrachalam
D. A. Government Polytechnic, Ongole
Govt. Institute of Electronics, Secunderabad
S. G. M. Govt. Polytechnic, Vanasthalipuram
Govt. Model residential Polytechnic, Padaru
Govt. Institute of Pharmacy, Kurnool
Smt. Durgbhai Deshmuk, Govt. Women's Technical Training Institute, Hyderabad
Govt. Institute of Textile Technology, Guntur
Govt. Polytechnic for Women, Cuddapah
Govt. Polytechnic for Women, Palamaneru
Govt. Polytechnic for Women Nizamabad
Govt. Institute of Advanced Technician Courses, Hyderabad
Govt. Institute of Advanced Technician Courses, Viskhapatnam
Govt. Institute of Advanced Technician Courses, Tirupathi
Q. Q. Govt. Polytechnic, Old City, Hyderabad
Govt. Polytechnic, Narsipatnam
Govt. Polytechnic for Women, Ethamukhala
Govt. Polytechnic for Women, Hindupur
Govt. Polytechnic for Women, Medak
Govt. Model Residential Polytechnic, Srisailam
Govt. Model Residential Polytechnic, Rajahmundry
Govt. Model Residential Polytechnic, Madanapally
Govt. Institute of Leather Technology, Hyderabad
Govt. Institute of Ceramic Technology, Gudur
Govt. Polytechnic, Nalgonda
Govt. Polytechnic for Women, Suryapet
Govt. Model Residential Polytechnic, Gajwel
Govt. Polytechnic for Women, Nandigama
Govt. Polytechnic, Zaheerabad
Govt, Polytechnic, Sirsilla

Assam
Assam Engineering Institute, Guwahati
Nowgong Polytechnic, Nagaon
Prince of Wales Institute, Jorhat
Dibrugarh Polytechnic, Lahoal
Silchar Polytechnic, Silchar
Bongaigaon Polytechnic, Bongaigaon
Assam Textile Institute Guwahati
Girls Polytechnic, Guwahati

Haryana
Govt. Polytechnic, Ambala City
Govt. Polytechnic, Jhajjar
Govt. Polytechnic, Sirsa
Haryana Polytechnic, Nilokheri
Govt. Institute of Engineering, Sonepat
Govt. Institute of Management and Pharmacy, Adampur
Govt. Polytechnic for Women, Ambala City
Govt. Polytechnic, Uttawap, Faridabad
Y. M. C. A. Institute of Engineering, Faridabad
Vaish Technical Institute, Rohtak
Chhotu Ram Polytechnic, Rohtak
Kanya Gurukul Women's Polytechnic, Khanpur Kalan
Seth Jai Parkash Polytechnic, Damla, Yamunanagar

Himachal Pradesh
Govt. Polytechnic, Sundernagar
Govt. Polytechnic, Hamirpur
Govt. Polytechnic, Rohroo
Govt. Polytechnic, Kangra
Govt. Polytechnic for Women, Kandaghat

Maharashtra
Govt. Polytechnic, Bombay
Govt. Polytechnic Pune
Govt. Polytechnic, Aurangabad
Govt. Polytechnic, Amravati
Govt. Polytechnic, Nagpur
Govt. Polytechnic, Nashik
Cusrow Wadia Institute of Technology, Pune
Govt. Polytechnic, Karad
Shri Bhagubhai Mafatlal Polytechnic, Bombay
Institute of Hotel Management & Catering, Pune

V. J. Technical Institute, Bombay
M. H. Saboo Siddik Polytechnic, Bombay
K. J. Somaiya Polytechnic, Bombay
Agnel Junior Technical College, Bombay
Govt. Polytechnic, Ratnagiri
Govt. Polytechnic Solapur
Govt. Polytechnic, Kolhapur
Walchand College of Engineering, Vishrambaug Sangli
Govt. Polytechnic for Distance Learning, Pune
Govt. Polytechnic, Latur
Govt. Polytechnic, Nanded
Govt. Polytechnic, Khamgaon
Govt. Polytechnic, Yavatmal
Govt. Polytechnic, Jalgaon
Govt. Polytechnic, Dhule

Civil & Rural Engineering Polytechnic, Wardha
Panjanbrao Deshmuk Polytechnic, Amravati
Institute of Civil & Rural Engineering, Gargoti

Punjab
Govt. Polytechnic, Amritsar
Govt. Polytechnic, Batala
Govt. Polytechnic, Hoshiarpur
Govt. Polytechnic, G. T. B. Garh
Govt. Polytechnic, Bathinda
G. N. E .C. Ludhiana
R. Polytechnic, Phagwara
M. C. Polytechnic, Jalandhar
Thapar Polytechnic, Patiala
Textile Institute, Amritsar
Garment Tech. Institute, Amritsar
Training Institute, Jalandhar
Women's Polytechnic, Jalandhar
Textile & Knitting Institute, Ludhiana
Women's Polytechnic, Patiala
Govt. Polytechnic, Ferozpur
Govt Polytechnic for Women, Amritsar
Govt. Polytechnic for Women, Ludhiana
Govt. Polytechnic for Women, Ropar

Tamil Nadu
Central Polytechnic, Madras
Govt. Polytechnic, Krishnagiri
Govt. Polytechnic, Coimbatore
Govt. Polytechnic, Tirucharapally
Govt. Polytechnic, Madurai
Algappa Polytechnic, Karaikuddi
Govt. Polytechnic for Women, Coimbatore
Bharthiar Centenary Memorial Women's Polytechnic, Ettayapuram
Srinivasa Subbaraya Polytechnic, Puttur
Govt. Polytechnic for women, Madras
C. N. Polytechnic, Madras
Ramakrishna Mission Technical Institute, Madras
Murugappa Polytechnic, Sathya Murthy Nagar
C. M. Kothari Technological Institute, Chembarapakkam
Rajagopal Polytechnic, Gudiyatham
Muthiah Polytechnic, Annamalai Nagar
P. S. G. Polytechnic, Coimbatore
C. I. T. Polytechnic, Coimbatore
G. R. G. Polytechnic for Women, Coimbatore
Seshasayee Institute of Technology, Tiruchirapalli
Periyar Centenary Girls Polytechnic, Vallam
Padmabushan N. Ramasamy Memorial Girls Polytechnic, Trichy
A. D. J. Dharmambal Women's Polytechnic, Nagapattnam

Arulmigu Palaniandavar Polytechnic for Women, Palani
Ayya Nadar Jannaki Amal Women's Polytechnic, Sivakasi
Annamalai Polytechnic, Chettinad
Virudhunagar S. Vellaichamy Nadar Polytechnic, Virudhunagar
Arasan Ganesan Polytechnic, Sivakasi
P. A. C. Ramaswami Raja's Polytechnic, Rajapalayam
Govt. Polytechnic for Women, Madurai

West Bengal
A. P. C. Ray Polytechnic, Calcutta
Jnan Ch. Gosh Polytechnic, Calcutta
North Calcutta Polytechnic, Calcutta
Central Calcutta Polytechnic, Calcutta
Women's Polytechnic, Calcutta
Birla Institute of Technology, Calcutta
The Regional Institute of Printing Technology, Calcutta
Engineering Institute for Junior Executives, Howrah
Hooghly Institute of Technology, Hooghly
Jagadish Ch. Polytechnic
Asansol Polytechnic, Burdwan
Murshidabad Institute of Technology, Berhampore
I. C. V. Polytechnic, Jhargram, Midnapore
Sree Ramakrishna Silpavidyapeeth Polytechnic, Suri, Birbhum
K. G. Engineering Institute, Vishnupur, Bankura
M. B. C. Institute of Engineering & Technology, Burdwan
B. P. C. Institute of Technology, Krishnagar
Jalpaiguri Polytechnic Institute
Malda Polytechnic
Purulia Polytechnic
Kanyapur Polytechnic, Asansol
Coochbehar Polytechnic, Cooch Behar
Darjeeling Polytechnic, Kurseong
Raiganj Polytechnic
Contai Polytechnic
Ramakrishna Mission Shilpamandira, Belur
Ramakrishna Mission Shilpapitha, Belgharia
Calcutta Technical School
Bendel Survey Institute
Mining Institute, Raniganj

Delhi
G. B. Pant Polytechnic, Okhla, New Delhi
Aryabhat Polytechnic, G. T. Karnal Road, Delhi
Pusa Polytechnic, Pusa, New Delhi
IVth Boy's Polytechnic, Pusa, New Delhi
Women's Polytechnic, Maharani Bagh, New Delhi
Kasturba Polytechnic, Maharani Bagh, New Delhi
College of Pharmacy, Pushp Vihar, Sector 3 Mehrauli-Badarpur Road, New Delhi
Institute of Commercial Practice, Patparganj Road, Delhi
Govt. Polytechnic, Papankalan, Dwarkapuri, Delhi

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Capacity Building

A. Summary of Technical Assistance

State	Local Consultants	Foreign Fellowships	Local Fellowships	Total Staff Months
Assam	152	38	3,468	3,658
Andhra Pradesh	100	50	1,090	1,240
Haryana	80	60	1,050	1,050
Himachal Pradesh	92	21	634	747
Maharashtra	816	100	4,000	4,916
Punjab	50	84	2,500	2,634
Tamil Nadu	55	220	3,101	3,376
West Bengal	380	80	3,000	3,460
Delhi	100	25	3,300	3,425
Total	1825	678	22,143	24,646

B. Local Consultants

State	Staff Months					
	1992	1993	1994	1995	1996	Total
Assam	30	30	35	40	17	152
Andhra Pradesh	10	10	80	-	-	100
Haryana	15	40	25	-	-	80
Himachal Pradesh	4	9	27	26	26	92
Maharashtra	160	164	164	164	164	816
Punjab	10	10	10	10	10	50
Tamil Nadu	10	10	12	11	12	55
West Bengal	60	70	75	75	100	380
New Delhi	20	20	20	20	20	100
Total	319	363	448	346	349	1825

C. Foreign Fellowships

State	Staff Months					
	1992	1993	1994	1995	1996	Total
Assam	7	11	11	9	-	38
Andhra Pradesh	10	10	10	10	10	50
Haryana	10	15	15	10	10	60
Himachal Pradesh	-	2	6	7	6	21
Maharashtra	20	20	20	20	20	100
Punjab	20	24	24	16	-	84
Tamil Nadu	20	50	50	50	50	220
West Bengal	10	10	20	20	20	80
New Delhi	5	5	5	5	5	25
Total	102	147	161	147	121	678

D. Local Fellowships

State	Staff Months					
	1992	1993	1994	1995	1996	Total
Assam	300	800	800	780	788	3,468
Andhra Pradesh	100	300	300	300	90	1,090
Haryana	210	250	250	250	90	1,050
Himachal Pradesh	81	108	143	152	150	634
Maharashtra	800	800	800	800	800	4,000
Punjab	500	500	500	500	500	2,500
Tamil Nadu	620	620	620	620	621	3,101
West Bengal	600	600	600	600	600	3,000
New Delhi	660	660	660	660	660	3,300
Total	3,871	4,638	4,673	4,662	4,299	22,143

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Project Costs

Table 1: SUMMARY COSTS BY COMPONENTS AND TIME

(RS '000)

	Base Costs							Total	
	91/92	92/93	93/94	94/95	95/96	96/97	97/98	RS	(US$ '000)
A. CAPACITY EXPANSION									
PROGRAMS IN NEW TECHNOLOGIES	95,790.8	128,624.7	147,984.3	123,139.2	93,608.2	85,877.3	82,203.6	758,228.2	42,123.8
NEW COEDUCATIONAL POLYTECHNICS	32,329.8	60,989.8	84,523.4	87,275.2	72,565.6	62,861.7	53,740.9	454,286.3	25,238.1
PROGRAMS IN CONTINUING EDUCATION	19,692.5	25,447.7	29,133.6	26,564.6	22,868.1	22,512.4	21,289.2	167,508.1	9,306.0
COMMUNITY POLYTECHNICS	14,958.2	27,026.5	32,442.0	23,338.1	18,571.5	17,717.4	15,626.5	149,680.2	8,315.6
WOMEN S POLYTECHNICS	48,113.0	102,440.6	133,964.0	110,029.3	84,203.3	67,722.7	58,939.9	605,420.7	33,634.5
STUDENT AND FACULTY HOUSING	63,246.1	132,064.0	171,031.2	130,269.8	82,586.7	63,486.5	48,583.4	691,267.8	38,403.8
Sub-Total CAPACITY EXPANSION	274,130.4	476,601.3	599,078.4	500,616.2	374,403.5	320,178.0	281,383.5	2,826,391.3	157,021.7
B. QUALITY IMPROVEMENT									
TEACHER TRAINING	45,233.4	54,764.6	59,533.5	46,443.2	36,554.7	33,826.7	30,889.6	307,245.8	17,069.2
CURRICULUM DEVELOPMENT	4,803.8	6,869.5	8,411.0	7,386.6	6,484.2	6,574.5	6,369.4	46,899.0	2,605.5
EQUIPMENT AND FACULTY IMPROVEMENT PROGRAM	131,641.4	351,650.3	497,095.1	363,993.2	236,797.8	217,818.6	199,595.7	1,998,592.0	111,032.9
MAINTENANCE CELLS	11,252.4	20,604.1	26,808.5	21,037.1	17,800.5	18,187.9	18,271.5	133,962.0	7,442.3
Sub-Total QUALITY IMPROVEMENT	192,931.0	433,888.5	591,848.1	438,860.0	297,637.3	276,407.7	255,126.2	2,486,698.7	138,149.9
C. EFFICIENCY IMPROVEMENT									
STRENGTHENING STATE DIRECTORATE OF TECH. EDUC.	30,646.9	50,501.8	64,130.8	54,442.4	41,950.0	40,686.7	38,070.7	320,429.3	17,801.6
GRANTING AUTONOMY TO POLYTECHNICS	2,701.1	4,114.7	4,926.3	4,084.7	3,943.8	3,923.1	3,615.4	27,309.2	1,517.2
PROMOTING INDUSTRY - INSTITUTE INTERACTION	16,916.7	29,394.3	35,373.7	27,414.2	24,626.3	25,851.6	25,515.6	185,092.5	10,282.9
Sub-Total EFFICIENCY IMPROVEMENT	50,264.8	84,010.8	104,430.9	85,941.3	70,520.1	70,461.3	67,201.8	532,831.0	29,601.7
Total BASELINE COSTS	517,326.2	994,500.6	1,295,357.4	1,025,417.5	742,560.9	667,047.0	603,711.4	5,845,921.0	324,773.4
Physical Contingencies	45,650.1	92,004.2	120,502.5	92,755.8	63,695.2	55,733.4	47,442.6	519,783.9	28,876.9
Price Contingencies	27,632.1	151,929.4	319,347.4	345,997.0	317,195.7	348,856.7	375,548.2	1,886,506.4	8,459.4
Total PROJECT COSTS	590,608.4	1,238,434.2	1,735,207.3	1,464,170.3	1,123,451.8	1,071,637.0	1,028,702.3	8,252,211.3	362,109.6
Taxes	16,906.6	39,656.8	56,582.0	45,220.5	30,743.6	27,921.7	25,956.7	242,988.0	10,719.9
Foreign Exchange	147,161.7	353,377.9	509,612.0	411,143.9	280,841.7	255,265.0	237,061.3	2,194,463.5	96,714.8

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Table 2: SUMMARY COSTS BY CATEGORIES OF EXPENDITURE AND TIME

	Base Costs (RS Million)								Foreign Exchange	
	91/92	92/93	93/94	94/95	95/96	96/97	97/98	Total	%	Amount
I. INVESTMENT COSTS										
A. CIVIL WORKS	203.1	440.2	570.2	404.2	237.0	181.2	139.0	2,174.9	25.8	561.1
B. FURNITURE	18.1	41.3	55.2	40.2	24.4	17.2	13.3	209.8	15.5	32.6
C. VEHICLES	16.0	21.1	20.5	12.3	5.5	3.8	2.2	81.4	51.0	41.5
D. EQUIPMENT	116.2	282.2	391.8	296.8	186.9	165.7	151.6	1,591.2	41.0	652.2
E. LOCAL FELLOWSHIPS	9.4	11.0	12.0	11.4	11.1	10.2	8.7	73.8	0.0	0.0
F. FOREIGN FELLOWSHIPS	5.3	6.5	8.0	8.4	8.1	7.8	7.4	51.5	90.4	46.5
G. LOCAL CONSULTANT	3.9	5.1	5.2	3.8	3.9	3.3	2.1	27.3	0.0	0.0
H. FOREIGN CONSULTANT	0.1	0.4	0.7	0.6	0.2	0.1	0.1	2.2	70.9	1.5
I. BOOKS	11.6	17.0	19.8	15.2	9.2	7.1	5.9	85.7	20.7	17.7
J. LOCAL TRAINING	10.3	5.7	4.3	3.5	3.6	2.5	1.5	31.4	0.0	0.0
K. SCHOLARSHIPS	0.9	1.0	1.0	1.1	0.9	0.9	0.9	6.7	0.0	0.0
Total INVESTMENT COSTS	394.9	831.4	1,038.7	797.5	490.8	399.8	332.7	4,335.9	31.2	1,353.2
II. RECURRENT COSTS										
A. SALARIES OF ADDITIONAL STAFF	90.8	118.3	148.5	165.9	182.4	193.6	197.0	1,096.5	0.0	0.0
B. CONSUMABLE MATERIALS	18.7	27.5	36.5	38.0	41.0	43.2	44.0	248.9	20.7	51.5
C. OPERATION AND MAINTENANCE	12.9	17.2	21.7	24.0	26.5	30.4	30.0	164.6	5.2	8.6
Total RECURRENT COSTS	122.4	163.1	206.6	227.9	251.8	267.2	271.0	1,510.0	4.0	60.0
Total BASELINE COSTS	517.3	994.5	1,295.4	1,025.4	742.6	667.0	603.7	5,845.9	24.2	1,413.2
Physical Contingencies	45.7	92.0	120.5	92.8	63.7	55.7	47.4	519.8	26.7	138.9
Price Contingencies	27.6	151.9	319.3	346.0	317.2	348.9	375.5	1,886.5	34.0	642.3
Total PROJECT COSTS	590.6	1,238.4	1,735.2	1,464.2	1,123.5	1,071.6	1,026.7	8,252.2	26.6	2,194.5
Taxes	16.9	39.7	56.6	45.2	30.7	27.9	26.0	243.0	0.0	0.0
Foreign Exchange	147.2	353.4	509.6	411.1	280.8	255.3	237.1	2,194.5	0.0	0.0

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Table 3: SUMMARY COSTS BY COMPONENT AND CATEGORIES OF EXPENDITURE

(B$ Million)

	CAPACITY EXPANSION						QUALITY IMPROVEMENT				EFFICIENCY IMPROVEMENT					
	PROGRAMS IN NEW TECHNOLOGIES	NEW COEDUCATIONAL POLYTECHNICS	PROGRAMS IN CONTINUING EDUCATION	COMMUNITY POLYTECHNICS	WOMEN'S POLYTECHNICS	STUDENT AND FACULTY HOUSING	TEACHER TRAINING	CURRICULUM DEVELOPMENT	EQUIPMENT AND FACULTY IMPROVEMENT PROGRAM	MAINTENANCE CELLS	STRENGTHENING STATE DIRECTORATE OF TECH. EDUC.	GRANTING AUTONOMY TO POLYTECHNICS	PROMOTING INDUSTRY - INSTITUTE INTERACTION	Total	Physical Contingencies	
															%	Amount
I. INVESTMENT COSTS																
A. CIVIL WORKS	141.5	207.2	14.9	36.0	337.7	594.8	53.1	5.6	679.5	11.8	63.0	2.2	27.7	2,174.9	10.0	217.5
B. FURNITURE	22.3	9.9	3.8	4.7	15.3	36.7	15.1	1.9	79.3	2.0	11.4	1.1	6.3	209.8	10.0	21.0
C. VEHICLES	3.0	4.9	6.3	7.2	5.6	-	0.7	1.4	27.2	2.8	11.9	0.3	10.0	81.4	10.0	8.1
D. EQUIPMENT	293.2	140.9	13.2	20.9	106.3	17.9	39.9	7.5	919.9	12.4	31.1	3.5	17.4	1,591.2	10.0	159.1
E. LOCAL FELLOWSHIPS	2.8	1.6	0.8	8.6	1.2	-	37.9	1.1	11.7	0.2	1.2	3.2	3.4	73.8	5.0	3.7
F. FOREIGN FELLOWSHIPS	1.6	1.6	0.8	4.7	0.4	-	26.8	0.9	8.0	-	4.9	0.8	1.0	51.5	5.0	2.6
G. LOCAL CONSULTANT	2.0	2.0	1.1	5.4	0.5	-	1.5	2.1	5.3	0.2	2.9	1.0	3.4	27.3	5.0	1.4
H. FOREIGN CONSULTANT	0.9	0.4	-	-	-	-	0.2	-	-	-	-	-	0.6	2.2	5.0	0.1
I. BOOKS	17.1	3.7	5.5	1.0	4.5	-	21.2	1.5	74.6	0.1	4.2	0.2	2.0	85.7	10.0	8.6
J. LOCAL TRAINING	-	1.5	1.5	-	0.8	-	25.9	0.1	1.2	0.2	0.1	-	0.2	31.4	5.0	1.5
K. SCHOLARSHIPS	-	-	-	6.3	0.4	-	-	-	-	-	-	-		6.7	5.0	0.3
Total INVESTMENT COSTS	484.5	341.7	47.7	94.7	472.7	649.4	222.3	22.1	1,756.0	29.7	130.6	12.3	72.0	4,335.9	9.8	423.6
II. RECURRENT COSTS																
A. SALARIES OF ADDITIONAL STAFF	231.8	87.9	102.0	31.6	113.8	35.2	59.0	18.8	137.2	41.7	142.9	9.1	85.5	1,096.5	5.0	54.8
B. CONSUMABLE MATERIALS	20.8	17.3	10.4	17.3	8.3	1.8	15.0	4.2	57.4	50.7	22.1	3.2	12.4	248.9	10.0	24.9
C. OPERATION AND MAINTENANCE	13.2	7.4	7.3	6.1	10.6	4.9	11.0	1.7	46.0	11.8	24.9	2.7	15.1	164.6	10.0	16.5
Total RECURRENT COSTS	273.7	112.6	119.8	54.9	132.7	41.8	85.0	24.8	242.6	104.3	189.8	15.0	113.0	1,510.0	6.4	96.2
Total BASELINE COSTS	758.2	454.3	167.5	149.7	605.4	691.3	307.2	46.9	1,998.6	134.0	320.4	27.3	185.1	5,845.9	8.9	519.8
Physical Contingencies	63.9	40.7	11.4	11.8	54.7	67.4	23.2	3.5	191.7	11.3	24.4	2.0	13.8	519.8	0.0	0.0
Price Contingencies	236.3	159.1	50.2	46.0	194.8	209.6	90.6	15.0	676.2	43.4	98.5	8.6	58.0	1,886.5	8.1	153.1
Total PROJECT COSTS	1,058.4	654.2	229.1	207.5	854.9	968.2	421.1	65.4	2,866.5	188.7	443.4	37.9	256.9	8,252.2	8.2	673.2
Taxes	31.0	19.3	3.2	4.9	23.8	27.5	7.9	1.3	186.2	5.3	7.8	0.6	4.2	243.0	9.1	22.1
Foreign Exchange	266.6	173.6	26.3	46.4	216.5	257.2	98.5	11.6	949.2	32.7	72.2	5.7	37.9	2,194.5	8.9	196.3

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Table 1: FINANCING PLAN BY COMPONENT

(US$ '000)

	INTERNATIONAL DEVELOPMENT ASSOCIATION		STATE GOVERNMENT		GOVERNMENT OF INDIA		Total				
	Amount	%	Amount	%	Amount	%	Amount	%	For. Exch.	Local (Excl. Taxes)	Duties & Taxes
A. CAPACITY EXPANSION											
PROGRAMS IN NEW TECHNOLOGIES	36,532.6	78.3	7,205.4	15.4	2,909.8	6.2	46,647.8	12.9	11,850.3	33,420.0	1,377.6
NEW COEDUCATIONAL POLYTECHNICS	21,226.5	74.9	3,035.7	10.7	4,074.6	14.4	28,336.8	7.8	7,529.9	19,970.8	836.1
PROGRAMS IN CONTINUING EDUCATION	6,613.2	66.0	2,842.6	28.4	560.6	5.6	10,016.5	2.8	1,176.6	8,696.3	143.6
COMMUNITY POLYTECHNICS	7,190.1	78.9	1,320.2	14.5	616.7	6.8	9,127.0	2.5	2,066.8	6,841.0	219.2
WOMEN S POLYTECHNICS	32,361.5	86.3	3,827.6	10.2	1,292.1	3.4	37,481.2	10.4	9,552.5	26,879.7	1,049.0
STUDENT AND FACULTY HOUSING	38,976.2	90.8	1,733.9	4.0	2,199.7	5.1	42,909.9	11.8	11,402.7	30,288.0	1,219.1
Sub-Total CAPACITY EXPANSION	142,900.2	81.9	19,965.6	11.4	11,653.4	6.7	174,519.2	48.2	43,578.8	126,095.8	4,844.5
B. QUALITY IMPROVEMENT											
TEACHER TRAINING	15,167.3	81.3	2,099.8	11.3	1,394.3	7.5	18,661.4	5.2	4,370.6	13,933.8	357.0
CURRICULUM DEVELOPMENT	2,053.7	72.1	589.6	20.7	205.7	7.2	2,849.0	0.8	515.2	2,274.7	59.0
EQUIPMENT AND FACULTY IMPROVMENT PROGRAM	105,392.0	93.9	6,074.5	6.4	12,186.0	9.7	125,652.6	34.7	41,602.9	79,389.3	4,660.4
MAINTENANCE CELLS	5,163.2	62.9	2,274.5	27.7	765.7	9.3	8,203.3	2.3	1,440.9	6,530.0	232.4
Sub-Total QUALITY IMPROVEMENT	127,776.1	82.2	13,038.4	8.4	14,551.7	9.4	155,366.3	42.9	47,929.7	102,127.8	5,308.8
C. EFFICIENCY IMPROVEMENT											
STRENGTHENING STATE DIRECTORATE OF TECH. EDUC.	13,046.9	67.3	4,567.8	23.6	1,775.4	9.2	19,390.1	5.4	3,235.7	15,806.2	348.2
GRANTING AUTONOMY TO POLYTECHNICS	1,221.7	74.0	359.2	21.8	69.3	4.2	1,650.1	0.5	258.5	1,363.8	27.8
PROMOTING INDUSTRY - INSTITUTE INTERACTION	7,874.1	70.4	2,750.0	24.6	559.9	5.0	11,183.9	3.1	1,712.0	9,281.5	190.4
Sub-Total EFFICIENCY IMPROVEMENT	22,142.6	68.7	7,676.9	23.8	2,404.6	7.5	32,224.2	8.9	5,206.2	26,451.5	566.5
Total Disbursement	292,819.0	80.9	40,680.9	11.2	28,609.8	7.9	362,109.6	100.0	96,714.8	254,675.0	10,719.9

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Table 2: FINANCING PLAN BY CATEGORIES OF EXPENDITURE

(US$ Million)

	INTERNATIONAL DEVELOPMENT ASSOCIATION		STATE GOVERNMENT		GOVERNMENT OF INDIA		Total		For. Exch.	Local (Excl. Taxes)	Duties & Taxes
	Amount	%	Amount	%	Amount	%	Amount	%			
A. CIVIL WORKS	120.2	88.8	2.3	1.7	12.9	9.5	135.3	37.4	38.2	93.1	4.1
B. FURNITURE	11.5	89.1	0.3	2.4	1.1	8.4	12.9	3.6	2.2	10.4	0.3
C. VEHICLES	4.6	90.2	0.2	3.0	0.4	6.8	5.2	1.4	2.8	2.1	0.3
D. EQUIPMENT	91.2	89.6	3.0	3.0	7.6	7.5	101.9	28.1	44.9	51.9	5.1
E. SALARIES OF ADDITIONAL STAFF	35.6	55.6	26.4	41.2	2.1	3.2	64.1	17.7	-	64.1	-
F. CONSUMABLE TRAINING MATERIALS	8.4	53.5	4.8	30.4	2.5	16.1	15.7	4.3	3.6	11.3	0.8
G. LOCAL FELLOWSHIPS	4.3	100.0	-	-	-	-	4.3	1 2	-	4.3	-
H. FOREIGN FELLOWSHIPS	3.4	100.0	-	-	0.0	0.0	3.4	0.9	3.1	0.3	-
I. LOCAL CONSULTANT	1.4	88.8	-	-	0.2	11.2	1.6	0.4	-	1.6	-
J. FOREIGN CONSULTANTS	0.1	100.0	-	-	-	-	0.1	0.0	0.1	0.0	-
K. OPERATION AND MAINTENANCE	5.4	53.2	3.5	34.7	1.2	12.1	10.2	2.8	0.6	9.6	-
L. BOOKS	4.7	88.0	0.2	3.0	0.5	9.0	5.3	1.5	1.2	3.8	0.3
M. LOCAL TRAINING	1.6	86.4	-	-	0.2	13.6	1.8	0.5	-	1.8	-
N. SCHOLARSHIPS	0.4	100.0	-	-	-	-	0.4	0.1	-	0.4	-
tal Disbursement	292.8	80.9	40.7	11.2	28.6	7.9	362.1	100.0	96.7	254.7	10.7

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ANNEX 24

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

RECURRENT COST IMPLICATIONS

TABLE 1. Actual and Projected Recurrent Expenditure on Education

Non-Plan Educ. Budget Allocation (Rs Million)	Actual FY86	FY87	FY88	FY89	FY90	Projected 1998
A. Andhra Pradesh	158.10	165.70	122.30	219.50	329.10	486.10
B. Assam	59.47	75.95	85.71	81.48	97.53	144.34
C. Haryana	191.91	206.90	277.90	251.80	356.01	452.00
D. Himachal Pradesh	37.00	51.10	63.00	75.00	64.00	94.40
E. Maharashtra	179.70	182.50	197.00	235.80	270.60	399.13
F. Punjab	251.30	245.20	276.50	308.70	310.00	434.00
G. Tamil Nadu	198.86	228.38	263.60	267.40	289.77	428.86
H. West Bengal	82.58	102.27	126.72	129.27	149.62	221.44
I. Delhi	21.5	24.01	29.00	31.55	30.38	44.81

TABLE 2. Recurrent Cost of Project 1998

J. Total Recurrent Cost of Project: Rs.440.0 million (US$17.1 million)
K. Andhra Pradesh Recurrent Costs: Rs.52.5 million (US$2.0 million)
L. Assam Recurrent Costs: Rs.21.0 million (US$0.8 million)
M. Haryana Recurrent Costs: Rs.51.8 million (US$2.0 million)
N. Himachal Pradesh Recurrent Costs: Rs.21.6 million (US$0.8 million)
O. Maharashtra Recurrent Costs: Rs.100.1 million (US$3.9 million)
P. Punjab Recurrent Costs: Rs.51.0 million (US$2.0 million)
Q. Tamil Nadu Recurrent Costs: Rs.77.7 million (US$3.0 million)
R. West Bengal Recurrent Costs: Rs.58.6 million (US$2.3 million)
S. Delhi Recurrent Costs: Rs.5.8 million (US$0.2 million)

TABLE 3. Recurrent Cost Implications

Andhra Pradesh recurrent cost as % of project AP Budget (K as % A)= 10.8%
Assam recurrent cost as % of project Assam Budget (L as % B)= 14.54%
Haryana recurrent cost as % of project Haryana Budget (M as % C)= 11.46%
Himachal Pradesh recurrent cost as % of project HP Budget (N as % D)= 23%
Maharashtra recurrent cost as % of project Maharashtra Budget (O as % E)= 25%
Punjab recurrent cost as % of project Punjab Budget (P as % F)= 11.75%
Tamil Nadu recurrent cost as % of project Tamil Nadu Budget (Q as % G)= 18.1%
West Bengal recurrent cost as % of project WB Budget (R as % H)= 26.4%
Delhi recurrent cost as % of project Delhi Budget (S as % I)= 12.9%

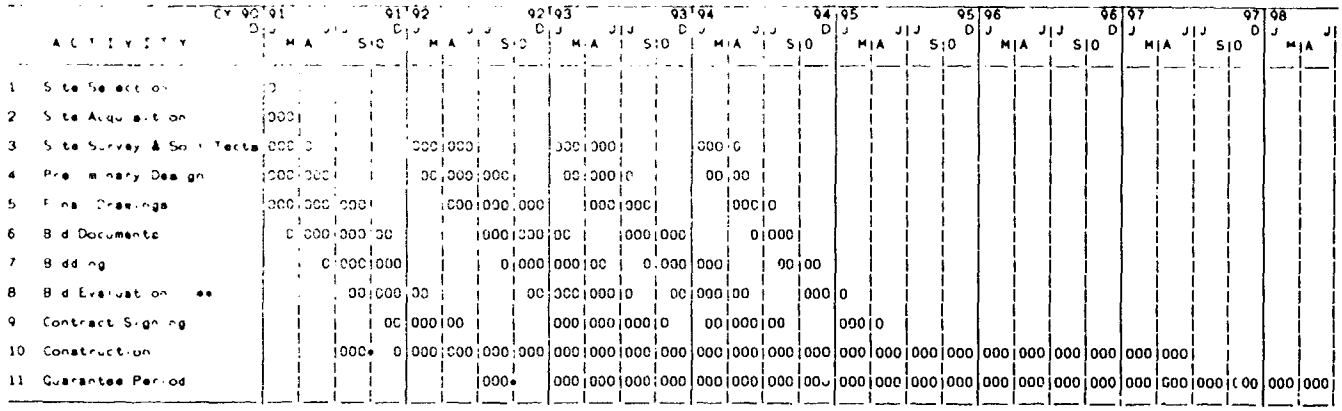
Sources: State Directorates of Technical Education.

ANNEX 25

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

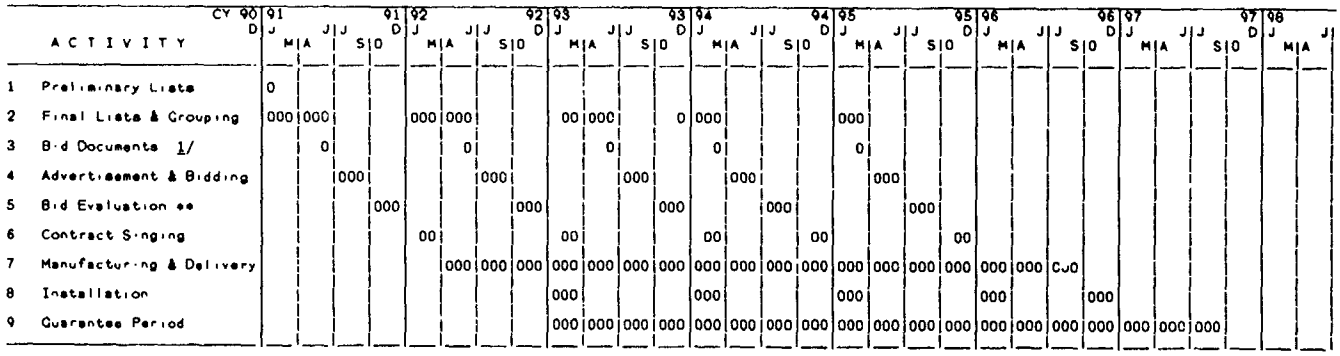
Civil Works General Implementation Schedule



Negotiations January 1991
Board Presentation March 1991
Effectiveness September 1991
Closing Date October 1998

* Anticipated construction of minor extensions retroactively financed
** Bank Group Review

Furniture and Equipment General Procurement Plan



1/ Standard Bid Documents are already approved

** Bank Group Review

ANNEX 26

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Key Indicators

Indicators/Measures	ANDHRA PRADESH		ASSAM		HARYANA		HIMACHAL PRADESH		MAHARASHTRA		PUNJAB		TAMIL NADU		WEST BENGAL		DELHI	
	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997	Present Status	Target by 1997
CAPACITY EXPANSION																		
1 New Co ed Polytechnics	42	43	7	7	11	14	3	4	48	49	16	16	44	44	30	32	8	9
2 Residential Polytechnics and Wings for Women	14	18	1	2	3	4	1	1	1	6	1	5	11	11	-	2	2	2
3 Total Number of Student Places Created	7854	9294	3456	3636	5355	6155	728	1656	25945	28136	6250	8948	9380	9800	12580	16124	7155	10000
4 Hostel Places for Men	3200	3425	2088	2088	1563	2400	330	610	2779	4154	1972	2302	2400	2400	1478	3196	175	215
5 Hostel Places for Women	-	2958	360	620	241	971	-	230	-	1320	180	420	1200	3600	104	648	90	110
6 Faculty Houses	160	341	95	169	61	352	23	88	-	98	158	278	128	240	40	207	-	-
7 Staff Quarters	120	238	76	115	89	213	99	173	-	200	232	287	-	-	38	43	280	300
8 New Labs & Workers	167	286	158	196	-	95	74	134	-	118	-	148	221	282	298	480	-	80
QUALITY IMPROVEMENT																		
1 % Teaching Posts Filled	83	100	71 3	100	78	100	86	100	80	100	86 86	100			83	100	66	90
2 % of Trained Teaching Staff	86	100	22 9	100	21	100	85	100	45	100	86.86	100			30	90	86	100
3 % of Modernized Labs and Workshops	-	56	-	80	50	100	10	75	80	90	80	100			15	80	80	100
4 No of Polytechnics with Learning Resource User Centers	56	59	-	9	-	11+2	-	100%	-	44	-	-			3	20	8	9
5 No of Staff in the Learning Resource Development Center	-	-	-	18	-	5(Key staff)	-	-	-	12	35	100			-	-	4	10
6 % of Courses with Curriculum Updated within the last five years	100	100	38 5	100	15	100	20	50	15	50	-	80			100	100	63	90
7 No of Students Graduating through Multi-Point Entry and Credit System	-	1500	15	1000	-	30	-	100	360 (SBM)	1620	240	540			-	10	-	100
8 % of Female Students enrolled	25	30	10 8	25	323	958	14 83	-	12	20	640	800			5	20	36	46
9 % of Scheduled Tribe/Caste Students	25	25	22	25	402	477	22	22	34	34	850	1070			12	20	22	22
10 % of Rural Students	40	40	75	75	695	980	88		40	80					90	80	1	2
EFFICIENCY IMPROVEMENT																		
1 Instructor/Student Ratio-Practical	1 20	1 20	1.15	1:15	1:15		1:18	1:18	1:20	1:20	1:18	1:18	20:1	20:1	1:20	1:15	1:36	1:11
2 Instructor/Student Ratio-Theory	1 60	1:60	1:30	1:30	1 10		1:30	1:30	1:60	1:60	1:45	1:45	18:1	11:1	1:11	1:20	1:36	1:11
3 Average Diploma Drop-out Rate,	10	10	1	1	10		8	-	36	20	10	-	1	-	2	2	6	3
4 Average Diploma Pass Rate, %	70	75	99	99	50		80	100	82	80	70	100	40	80	75	80	80	86
5 Number of Polytechnics with Student Counselling & Placement Centers/Cells	-	-	-	9	5		-	4	-	60	-	14	55	55	-	30	6	9
6 % of Teachers with Industrial Experience (over 3 Months)	80	80	30	75	25		82	100	25	80	10	100	10	100	90	90	80	96
7 % of Students in Industry Practice (in-plant) Programs	6 25	10	70	80	100% of Pro Dip course		-	100	10	30	10	80	80	80	5	75	40	80
8 % of Students Employed within 6 Months of Graduating	10	20	-	-	55		Specified date is not available	-	45	75	25	75	80	75	80	45	70	90
9. % of Students Employed in their Field of Training	90	90	-	-	90% approx.		- do -	-	80	90	70	100	75	100	80	80	86	90
10 Time taken to publish Examination Results (in weeks)	6	4	8	4	5 to 6		about 7 to 8	about 4	10	8	8-10	5-6	6	3	12	6	6	4
11 No of Autonomous Polytechnics	1	6	-	-	-		-	1	4	11	-	1	4	10	-	2	-	-

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Supervision Plan

A Plan for the Review of the Qualitative Aspects of Project Implementation

A. MANAGEMENT INFORMATION SYSTEM (MIS) FOR MONITORING AND SUPERVISION

1. The implementation of the First and Second Technician Education projects would require periodic monitoring of progress against an agreed implementation schedule and identified benchmarks. Because of the diversity and volume of data that will be handled, it is important that over time a computerized Management Information System (MIS) be established up to assist in carrying out this task.

Types of Data to be Processed by the MIS

2. The MIS should be designed to process the following indicative list of project data:

a) Financial Data

- Up-to-date expenditures made against each project component;
- Eligible amounts for disbursement and amounts actually disbursed to date.

b) Performance Data

- Civil works: status of construction, number of workshops, labs, classrooms, centers/cells, etc.;
- Procurement: status of procurement of equipment, furniture, vehicles, books, consumable materials, etc.;
- Training: status of teachers trained in industry, at the various institutes, locally and abroad, fellowships, study tours, etc.;
- Actual performance of the above against targets to date;
- Industry-Institute Interaction activities including number of sandwich courses, guest lecturers, in-plant training for teachers, consultancies, enrollment on Continuing Education Courses and amount of revenue generated, etc.

c) Quality and Efficiency Indicators

- A list of quality and efficiency improvement indicators for each State with the targeted monitorable benchmark to be achieved on a year-wise basis;

- Actual performance against targets with dates;

Institutionalizing the MIS

3. During the life of the project and beyond, it is anticipated that a fully operational project MIS would be developed by the NPIU in consultation with the States. This MIS could be used for regular information processing at both the national and State levels. The types of information that could be processed through the MIS would include:

- Admission to various courses category-wise and rank-wise;

- Plan allocations to each Department and amounts actually spent;

- Publications and teaching aids prepared by each institution;

- Addresses and other information on industries, contact persons and linkages developed;

- Continuing education programs conducted, enrollments and financial returns thereof;

- Staff development activities in collaboration with the TTTIs, industries and other organizations;

- Tracer data and employment records of graduates.

4. The Bank would work closely with NPIU and States as and if required, to share other experiences in the establishment and implementation of project MIS. A suggested schedule for Bank staff consultations and review for the first year of the project (CY91) is outlined from paragraph 32 onwards.

B. SUPERVISION OF THE PHYSICAL ASPECTS OF THE PROJECT

5. Quality Control Under the Projects: In view of the wide scope and diversity in the type of civil construction to be undertaken, the large amount of investment and the sizeable amount of financing under both the Technician Education Projects, the States must ensure that an adequate mechanism is designed to monitor the supervision of construction during the different stages of implementation. The Bank Staff Appraisal Reports based on discussions with State and Center officials already includes a brief description of existing responsibilities for the implementation and monitoring of construction activities under these projects. However, because State-level supervision of civil works to ensure good quality of construction is an area of special emphasis and concern of both the States and the Bank, it is important that the supervision mechanism be clearly elaborated.

6. Quality of Construction is necessarily a function of the type of supervision undertaken by the State. With this in mind, the general and specific responsibilities of the different State and local agencies, at different stages of the implementation, are outlined below for reference.

7. Responsibilities: The responsibility of quality control rests fully with the State and on its behalf, the supervising engineers and the

institutions and agencies during the preparation and implementation stages. In brief, the responsibilities are shared mainly by the following:

(a) the Client or Beneficiary;

(b) the Consulting Firm or Design Architect;

(c) the Contracting Firm or Contractor; and

(d) the Supervising Agency.

8. The Client: The Client's role is manifested in the selection of the Consultant Firm or Design Architect. The Client should have the choice of resorting to new designs and new planning as against utilizing previously conceived and possibly outdated standard designs. When the choice of the Client is to use standard designs, it should be ensured that these designs are updated to reflect the new academic requirements as well as their functional relationships. The Client should ensure the Design Architect of his choice has the full responsibility for making final decisions with respect to design, choice of materials and quality workmanship, acceptability or rejection of defective materials and faulty workmanship.

9. The Consulting Firm or Design Architect will be the main representative of the Client from the design/preparation stage to the completion of construction. They will deliver complete sets of architectural drawings, working drawings, site development plans, construction details and additional specifications to meet PWD standard specifications; ensure that structural and electro-mechanical designs and drawings are prepared and made part of the required sets for bidding; coordinate all drawings and ensure that no technical interference between the architectural design, structural and electro-mechanical designs take place; give consideration to exposures, orientation and prevailing winds in the design and in the implantation of buildings on site; and remain responsible for ensuring appropriate supervision and quality control of construction.

10. The Contractor has the major task of executing the works. Therefore, the quality of construction will depend on managing the site, the performance of the site engineer and technical staff in supervising the construction, as well as the performance of workers. The Contractor should be prequalified and thoroughly post qualified for the job prior to signing of a contract, following established criteria practiced by the States.

11. The Contractor, among other things, should be made responsible for providing adequate site management set-up and sufficient technical staff to ensure proper management of construction; well-prepared implementation charts which are synchronized with the different construction requirements; sufficient amount of labor on site; adequate required equipment; an experienced supervision engineer assisted by technicians when needed; updated schedules for supply of materials and labor; site book for recording activities, materials delivered, labor on site, issues and remedies; time to meet with the Design Architect for review of progress and resolving of issues.

12. The Site Resident Engineer represents on-site, the Consulting Firm and the Client, with major responsibility for ensuring that construction

activities take place normally and progress is made according to implementation schedules, that works are synchronized to maintain continuity in accordance with technical specifications and construction details as prepared by the Architect, control the quality of materials delivered, performance of workers and quality of workmanship on site, and to protect the Client's interest through maintaining efficiency and quality control. Among other responsibilities, the Site Engineer should review the Contractor's preparation of the site prior to starting of works; review and ensure the Contractor's management of the site and the adequacy of his technical staff; ensure that full sets of all drawings and specifications are also available on site; review the Contractor's construction charts, schedules for supply of materials and labor; ensure during the execution of works the Contractor's respect for established bench marks, leveling and alignment; check and ensure proper framing, appropriate scaffolding and safety on site; check quality of materials and workmanship to be provided in accordance with the specifications; ensure adherence to specifications and drawings, in particular for the execution of construction details; secure testing of materials and reject defective materials and workmanship; formulate remedies and on-site solutions, and issue in writing check lists and instructions for correction and making good; call for meetings with the Contractor and his sub-contractors for review and discussion of site issues; prepare and issue monthly reports on progress.

13. The Bank's Architect has a role to play under Bank financed projects and during implementation has the responsibility to review physical proposals for selected accommodations to see that they meet with the project requirements. Proposed areas for facilities and accommodations are reviewed to see that they fall within acknowledged area norms prescribed for planned facilities. Preliminary designs are reviewed to ensure efficient and economic planning, proper functional relationship and appropriate use of construction methods and materials as well as adequate implementation of buildings on site plan, orientation and exposures and other architectural and construction aspects. **The Bank Architect will visit and review selected sites to maintain the Bank's information base and discuss with project authorities issues arising from site selection and construction** (see Section 2.04 of the Project Agreement).

Supervision Mechanism

14. The mechanism should be designed to monitor the supervision under contract obligations with both the Contractor as well as the Consultant Firm or Design Architect. Its activities must reach every construction site as it is essential to ensure quality in each building. The activities for quality control will start at the Polytechnic level through the Project Implementation Cell (PIC). The technical section of the PIC will have an Engineer and/or Architect whose main responsibility is to monitor construction activities, the continuity and quality of work on site and to report to the PIC. The role is limited to visiting the construction sites, reviewing progress, recording and reporting. To avoid interference in progress of work, the Engineer/Architect will not be empowered to stop work, refuse or accept submitted materials or workmanship. His report to the PIC will outline issues and problems relating to progress and quality. The PIC will handle issues in dealing accordingly with the Consultant Firm and/or the site Engineer who are in charge of supervision. The latter will take matters to the Contractor, discuss and

solve issues raised by the PIC and see to it that the Contractor abides by the terms of his contract.

15. Periodic reports will be compiled by the PIC and submitted to the State's Project Implementation Unit (SPIU). The latter has a special Quality Control Unit whose responsibility also is to ensure the quality of construction for Government buildings through periodic visits to construction sites. The PWD Unit is centrally located and is represented regionally. The Unit will perform its duty independently from the activities of the PIC described above, but it will also interact with it and with the SPIU.

16. The SPIU would also have a role to play in quality control of construction. While all construction and quality issues should be resolved at the Polytechnic/PIC level, some issues may require the intervention of the SPIU Architect. The States have already assigned an Architect, recruited or deputed from the PWD, in the engineering/technical unit of the SPIU. The Architect will be responsible for visiting construction sites, monitoring the continuity and progress of work, controlling quality of construction, assembling and compiling submitted reports by PIC's and PWD's Quality Control Unit, preparing and submitting semi-annual reports to the National Project Implementation Unit (NPIU) at the central level. Such reports will cover a description of the overall status of construction, update progress in implementation, revise costs of civil works, comment on quality of construction works, relay issues encountered and remedies applied, update implementation schedule and indicate new completion date. The SPIU will ensure periodic visits to the State construction sites, and in particular to sites experiencing difficulties, having problems, and requiring assistance and solving of issues related to advancement of work and quality control.

17. The Architect in the NPIU will not be directly involved in the actual supervision of construction. His major role is to interact with the States through the SPIUs and monitor the overall physical implementation of the Project, ensure submission of progress reports of the State, review submitted reports and prepare an overall evaluation, provide recommendations and interact with the States and World Bank Teams when they visit India.

C. INDUSTRY-INSTITUTE INTERACTION

18. In the past, Polytechnics operated in isolation with little direct contact or involvement of industry. The Polytechnics, without any external inputs made few adjustments in their curricula, while their equipment became outdated and their teaching staff more academically oriented with little or no relevant industrial experience. Industry has more recently, managed to make better emolument and career development adjustments than the government sector with the result that it has become difficult for Polytechnics to attract people with industrial experience to its teaching staff. This further aggravates the isolation from which Polytechnics suffer.

19. In order to develop lasting linkages between Polytechnics and industry the following provisions are included in the proposed project:

(a) 29 Industry-Institute Interaction Central/Regional Cells (III-Cells) are being established the sixteen participating States and the Union Territory of New Delhi; and

(b) 372 Industry-Institute Interaction Cells would be set up in Polytechnics, each with a Training and Placement officer.

20. Regular and extensive reviews and assessments of key aspects of the process by the States and the NPIU will ensure that this most important part of the project fulfills expectations in a planned manner. The areas which require close coordination relate to the interaction between industry, State governments and Polytechnics.

21. Services which industry can supply to Polytechnics are as follows:

(a) participation in the development of new curricula in existing and new technology courses;

(b) training in industry of new and existing teaching staff properly supervised by the training officers of the industries involved;

(c) training of students in industry in a sandwich program and in a manner that ensures maximum benefit. This to be done by adjusting both time and content accordingly;

(d) attaching wherever feasible, free-standing government Polytechnics to an industry or a group of industries, thereby ensuring that training in the institutes are more realistic and relevant to industry;

(e) inducing industries to provide/subsidize guest lecturers to the Polytechnics because of the official low remuneration which institutions to pay.

22. Services which Polytechnics are expected to provide to industry include:

(a) the organization of Continuing Education courses for employees of industry to upgrade their knowledge and chances of further career development;

(b) arrange on request, specialized courses for industry;

(c) plan laboratories and workshops in such a way that they can be utilized for testing and other services to industry; and

(d) arrange in-plant training courses in industry;

23. Most of the above activities will also assist the Polytechnics to generate income to offset some of their operation and maintenance costs.

REVIEW OF IMPLEMENTATION

24. As a part of the Bank obligations under the Project Agreement, the Bank staff will from time to time be associated with and review progress in the implementation of Industry-Institute Interaction. The following is a preliminary list of activities which Bank staff has identified in consultation

with NPIU and States as critically important in the period to December 1991 and in which some Bank experiences can be useful:

(a) workshops with Technology Watch Group and industry for curriculum development including need analysis for new and emerging technology courses;

(b) the identification and planning of training for specialists in high technology in India and abroad and which will also assist, to some extent, the States in specifying equipment requirements, the training of teachers, and the installation and start up of the equipment; and

(c) workshops on Industry-Institute Interaction with the collaboration of the respective Directorates of Technical Education in all project States and the Union Territory of Delhi.

25. Engaging Industry in the Process. At the invitation of the State officials, Bank staff have attended a series of meetings with industrialists where the States have elicited the increased involvement of industry in Polytechnic training. On the bais of meetings (Bombay, Madras, New Delhi, Chandigarh), it is evident that the reaction and willingness of Industry to cooperate with the Directorates is further enhanced when they are assured that the States and Bank will remain active on this component of the project. Hence it is proposed that the States organize more such meetings/workshops and that Bank staff participate in these to the extent possible, to further demonstrate the Bank Group support of this type of collaboration.

26. Curriculum Development/Preparation of Equipment Requirements is the responsibility of the four Technical Teachers Training Institutes. The Bank would also want to be kept up-to-date and associated with the process especially where it involves the new technology courses e.g., Environmental Engineering, Fiber Optics, CAD/CAM, Computer Hardware, Robotics & Automation, Satellite Technology, Telematics, Bio-Technology and Sea-Bed Mining. The Bank can assist the NPIU and States by further facilitate the Technology transfer objective i=of the project. It is understood that after course outlines are prepared, a process of consultation begins with industry also involving equipment requirements and the training of teachers. The Bank could assist and/or facilitate delegations from TTTIs to visit industries and institutions in Europe and USA. Also, as a part of the normal project implementation review process, the Bank can bring in speciality experts in these high-tech areas to workwith TTTI and State Directorate Staff. These visits will be mainly in the fields of CNC machines and hi-tech electronics.

27. Teacher and Student Attachment Programs. Schemes should be developed by each State in consultation with industry to attach teachers and students for training in industry. Bank staff and consultants can, if requested, assist in bringing to this process, world-wide experiences and guidance.

28. Sustainability of Industry-Institute Interaction. For continuation of industry-institute interaction after the completion of the project, the established Advisory Committees should ensure that the Industry-Institute Cells continue functioning. Bank staff will review from time to time in conunction with the States and NPIU, the functioning of these Committees and Cells.

ANNEX 28

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Forecasts of Expenditures and Disbursements

IDA Fiscal Year and Semester	Expenditures Semester	Expenditures Cumulative	Disbursements Semester	Disbursements Cumulative	Cumulative As % of Total	Disbursement Profile (%) of Regional Education Projects	Semester from Appraisal Date
	--- US$ million ---						
FY92							
Jul 91-Dec 91	-	-	13.0	13.0 /a	4	-	2
Jan 92-Jun 92	15.30	15.30	0.8	13.8	4	6	3
FY93							
Jul 92-Dec 92	15.30	30.60	13.8	26.6	9	10	4
Jan 93-Jun 93	29.62	60.22	26.0	52.6	17	14	5
FY94							
Jul 93-Dec 93	29.62	89.84	26.0	78.6	26	18	6
Jan 94-Jun 94	39.44	129.28	34.4	113.0	37	26	7
FY95							
Jul 94-Dec 94	39.44	168.72	34.4	147.4	48	34	8
Jan 95-Jun 95	31.85	200.57	27.3	174.7	57	46	9
FY96							
Jul 95-Dec 95	31.85	232.42	27.3	202.0	66	54	10
Jan 96-Jun 96	23.40	255.82	19.3	221.3	72	62	11
FY97							
Jul 96-Dec 96	23.40	279.22	19.3	240.6	78	74	12
Jan 97-Jun 97	21.50	300.72	17.4	258.0	84	78	13
FY98							
Jul 97-Dec 97	21.50	322.22	17.4	275.4	90	86	14
Jan 98-Jun 98	19.95	342.17	15.9	291.3	95	94	15
FY99							
Jul 98-Dec 98	19.95	362.11	15.8	307.1	100	100	16
Jan 99-Jun 99							

Closing Date: June 1999

/a Special Account

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Selected Documents and Data Available in the Project Files

A. Documents Available by State

Andhra Pradesh

A-1 Project Report on Strenthening Technician Education in Andhra Pradesh with World Bank Assistance, Govt. of Andhra Pradesh, Dept. of Technical Education, Governmen Offices Building, Hyderabad, 28th August, 1990.

Assam

A-2 Project Report, Strengthening Technician Education in Assam with World Bank Assistance, Govt. of Assam, Directorate of Technical Education, Sept. 1990.

Haryana

A-3 Project Proposal for Strenthening of Technician Education in the State of Haryana (India) with World Bank Assistance, Directorate of Technical Education, Haryana, Chandigarh, Sep. 1990

Himachal Pradesh

A-4 Project for Strenghtening Technician Education with World Bank Assistance, Vol-I, Project Proposal, Dept. of Technical Education, Directorate of Technical Education, H. P., Sundernagar, District Mandi, Himachal Pradesh, Revised Sept. 1990

A-5 Vol-II, Detailed Project Report for Government Polytechnic Sundernagar, District Mandi, Himachal Pradesh.

A-6 Vol-III, Detailed Project Report for Government Polytechnic, Hamirpur, District Hamirpur, Himachal Pradesh.

A-7 Vol-IV, Detailed Project Report for Government Polytechnic Rohroo, District Shimla, Himachal Pradesh.

A-8 Vol-V, Detailed Project Report for Government Polytechnic (for Women) Kandaghat, District Solan, Himachal Pradesh.

A-9 Vol-VI, Summary of Expenditure and Phasing for Five Years of All Components, Himachal Pradesh.

A-10 Vol-VII, Part 1-8, Details of Inputs of Directorate, Development Centre, State Board of Technical Education, Upgrading of Junior Technical School and Polytechnics.

Maharashtra

A-11 Project for Strengthening Technician Education in Maharashtra State with World Bank Assistance, Government of Maharashtra, Technical Education Department, Bombay, Sept. 1990.

Punjab

A-12 Proposal for Strengthening of Technical Education in Punjab State with World Bank Assistance, Directorate of Technical Education, Punjab State, Chandigarh, Sept. 1990.

Tamil Nadu

A-13 Project Proposal for Development of Technician Education in Tamil Nadu with World Bank Assistance, Department of Technical Education Madras, Sept. 1990.

West Bengal

A-14 Project Report on Strengthening of Technician Education with World Bank Assistance, Directorate of Technical Education, West Bengal. Sept. 1990.

New Delhi

A-15 Project for Strengthening of Technician Education in Delhi with World Bank Assistance, Directoprate of Training and Technical Education, New Delhi, Sept 1990

CHART 1

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Articulation of the Education System

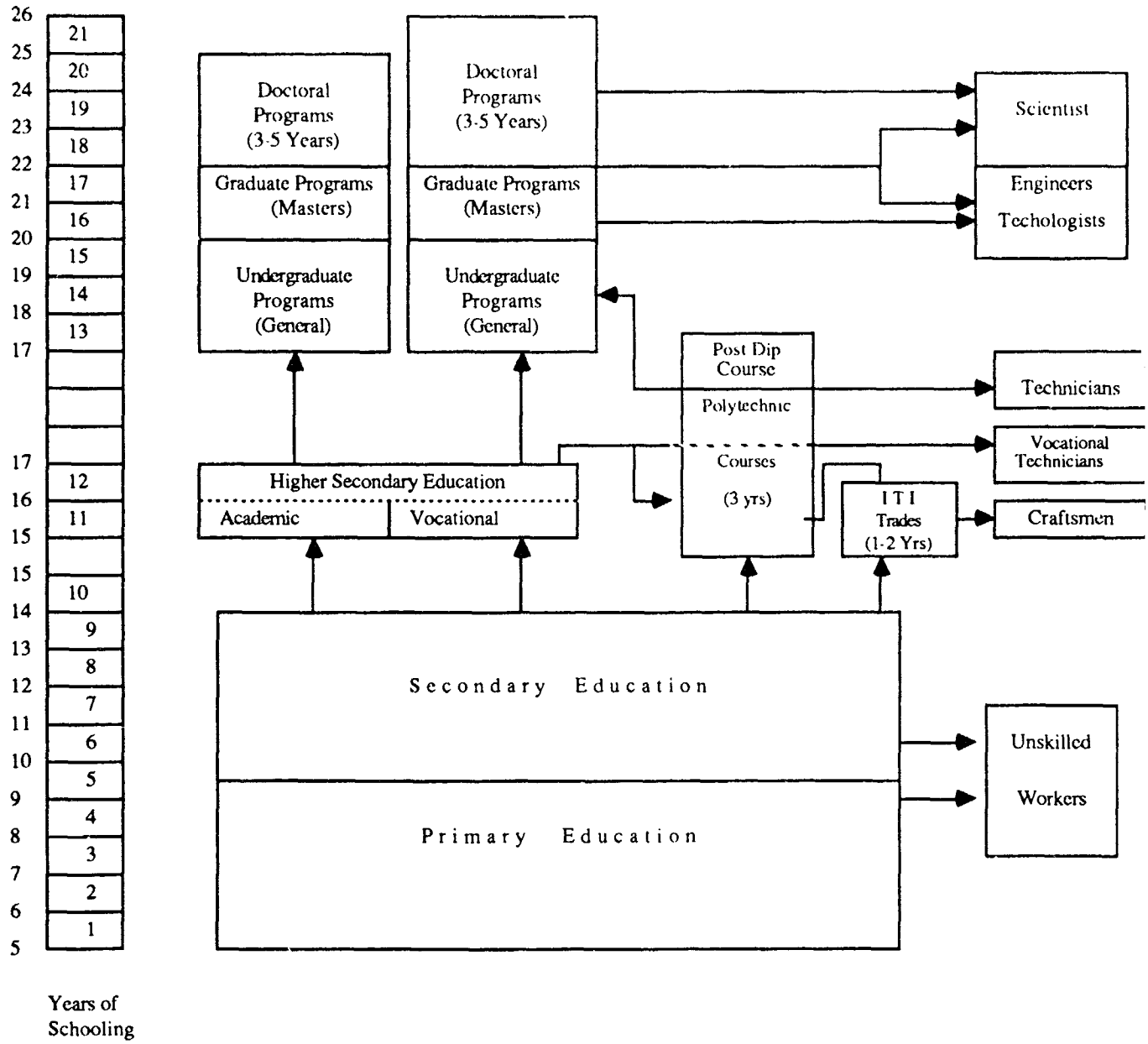
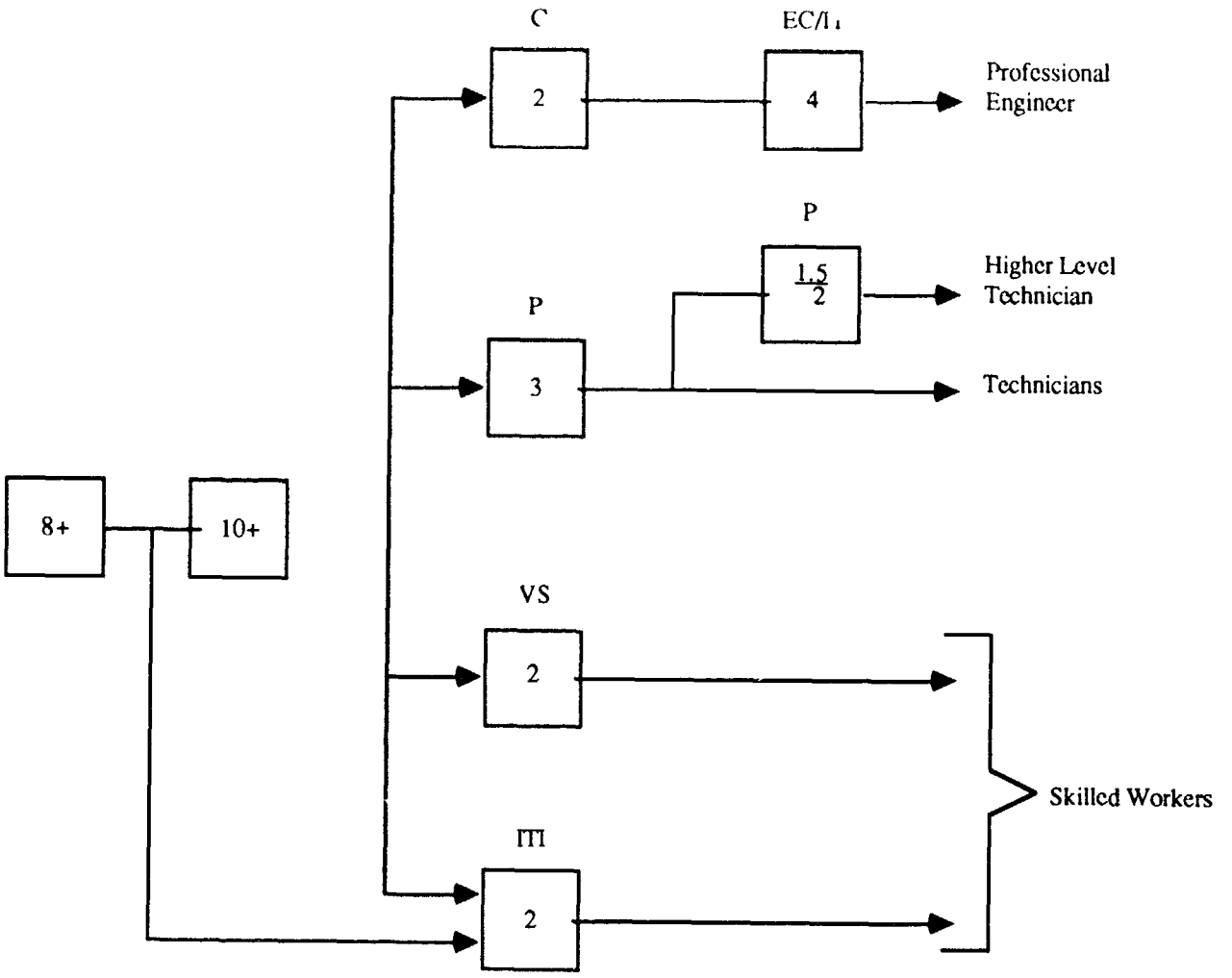


CHART 2

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Technician Education System in India



LEGEND

ITI - Industrial Training Institute
VS - Vocational Schools
P - Polytechnics
C - Colleges
EC/IT - Engineering Colleges/Institute of Technology

CHART 3

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Organizational Structure of Technical Education

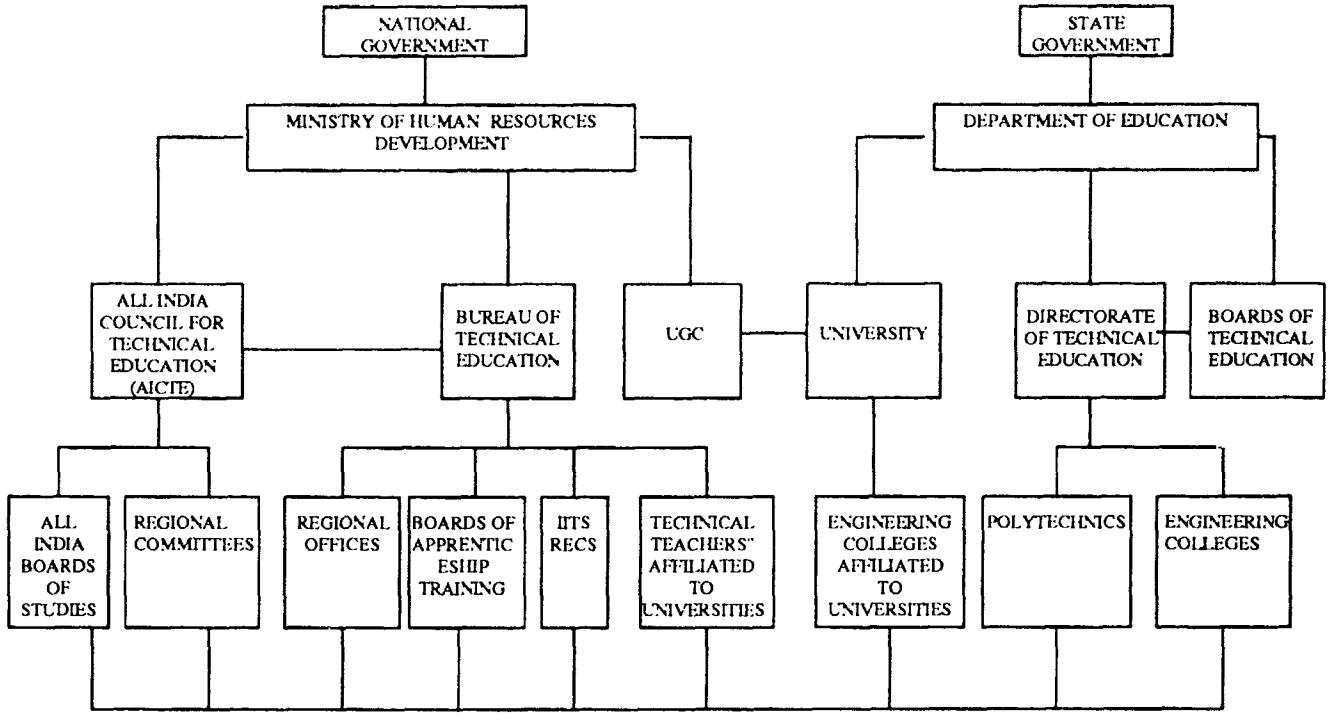


CHART 4

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

AICTE and Its Organizations

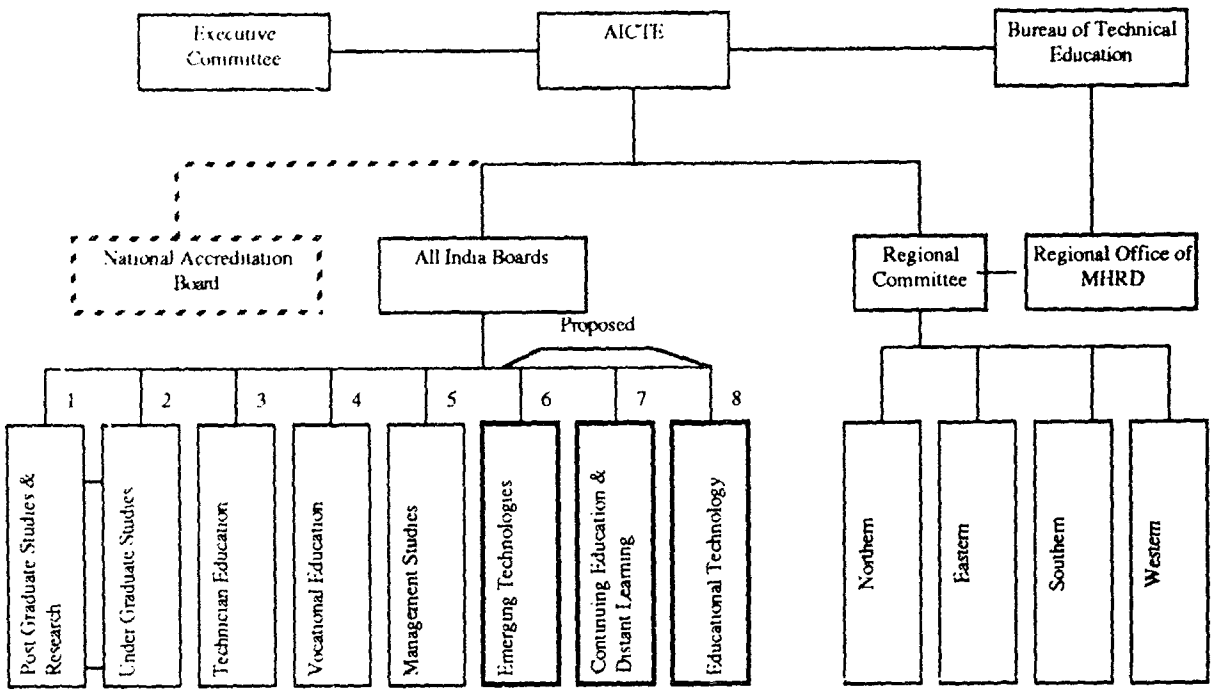


CHART 5

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Organizational Structure of NPIU at Ed.CIL

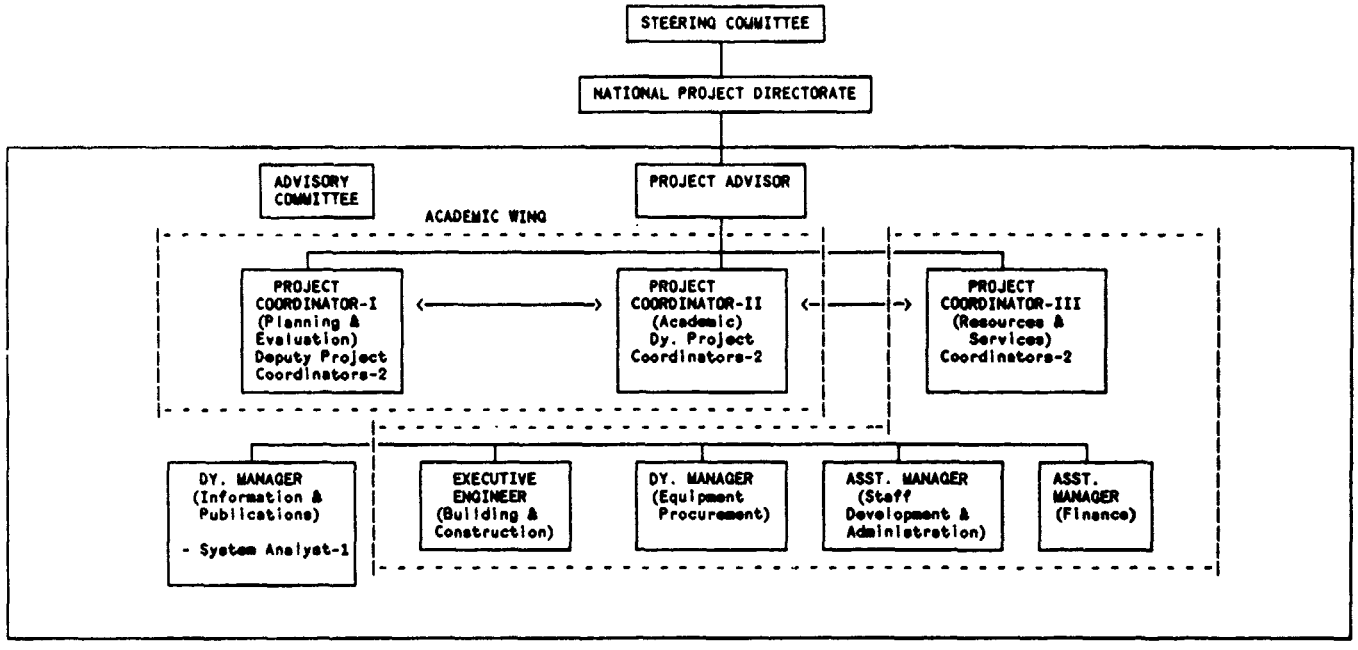


CHART 6

INDIA

SECOND TECHNICIAN EDUCATION PROJECT

Organizational Chart of National Project Directorate at BET of MHRD