

THE PERSPECTIVE PLAN FOR TAMIL NADU

TOWARDS A LEARNING SOCIETY

A PLAN FOR
EDUCATION, SCIENCE AND TECHNOLOGY
1972—1984

STATE PLANNING COMMISSION
EZHILAGAM, MADRAS-600 008

Sub. National Systems Unit,
National Institute of Educational
Planning and Administration
17-E, SriAurobindo Marg, New Delhi-110016
DCC. No.....
Date.....



DR. MALCOLM S. ADISESHIAH
Member.

State Planning Commission
Ezhilagam, Madras-5.

July 27, 1972.

My dear Chairman,

Subject.—State Planning Commission : Task Force on Education, Science and Technology ; Final Report, Letter of Transmittal for.

I have the honour to transmit to you the report of the Task Force on Education, Science and Technology that you set up on 20th October 1971. The report proposes a Plan for the regeneration of Education, Science Technology and Culture in Tamil Nadu over the twelve-year period, 1972-84. The basic proposal is to equate the right to education of every Tamilian with his right to employment. For this purpose, the Plan envisages free education in a disaggregated ten-year school system from the ages six to 14; vocationalising secondary education, which is the terminal point for the majority of the students in Tamil Nadu; a fee-based higher education system with a 2+2+2 or 2+3 staging; and a curriculam at all levels that will be functional to our urban and rural realities. The innovation in the proposed Plan is to provide the equivalent of basic five-year education both to all school drop-outs and repeaters who constitute around 60 per cent of students between Standards I and V and to our 60 per cent adult illiterates. At this primary level, the Plan envisages an integrated school and out-of-school education programme where students can enter, exit and re-enter the school, the home and the employment market in such a way that no one will be called, and maltreated as a drop-out and go without basic education on that account. Throughout the rest of the school and college systems, there is proposed an out-of school and out-of college education programme so that all those at work can have further education as they desire it and need it and so counter obsolescence.

The Plan also proposes a new and intensive scientific research and technology programme that will speed up the industrialisation and agricultural growth of Tamil Nadu. Special attention will also be paid to the promotion of Tamil culture at all levels and forms of education, both in its own interest and as a force for Tamil development.

The Plan calls attention to the need to ensure optimum returns to the very heavy investment by Government and by the people in Education. It recommends a slowing down of the rapid rate of growth in contemporaneous educational expenditures and re-deployment of educational finances, which, while making higher education fee-based, will concentrate on basic education for all out-of-school education post-graduate training and research and provide full and adequate scholarships to the poor so that they can have access to higher education.

I am presenting this report on behalf of the Task Force on Education, Science and Technology whose members were :

*Thiru K. DIRAVIAM.
Dr. V. SHANMUGASUNDARAM.
Professor M.V. MATHUR.
Selvi E. MATHEWS.
Dr. A. RAMACHANDRAN.
Professor G.R. DAMODARAN.
Thiru V.T. TITUS.
Thiru S. V. CHITTIBABU.
Thiru P. SIVALINGAM.
Thiru K. VENKATESAN. and
Thiru K. VENKATASUBRAMANIAM (Member-Secretary).*

Over a period of nine months, the Task Force worked both in plenary and working groups:

*Science and Technology, Chairman : Dr. A. RAMACHANDRAN.
School Education, Chairman : Thiru S. V. CHITTIBABU.
Higher Education, Chairman: Dr. V. SHANMUGASUNDARAM.
Adult Education, Chairman : Professor G. R. DAMODARAN, and
Internal Assessment and Semester System, Chairman :
Thiru P. SIVALINGAM.*

The simulation model was developed through the painstaking efforts of Professor S. K. Ekambaram, Statistical Consultant to the State Planning Commission.

The Secretary of the Task Force, Thiru K. Venkatasubramaniam, has brought to its work qualities of versatility, indefatigable service and speed of action without which the report could not have been completed in this short time span. I would like on this occasion to express my profound gratitude to members of the Task Force for their hard work, devotion and loyalty that have made the formulation and presentation of this Plan possible.

I remain at your service to provide any further information on the Perspective Plan and to help in any way its follow-up.

With kind regards,

*Yours sincerely,
MALCOLM S. ADISESHIAH.*

*To
DR. KALAINAR M. KARUNANIDHI.
Chairman,
State Planning Commission at
Fort St. George,
Madras-9.*

CONTENTS.

		PAGE :
	Letter of Transmittal ..	
	Contents	
	List of Tables	
CHAPTER	I Education, Science and Technology in Tamil Nadu in Retrospect	1
	II The Goals of Education, Science and Technology in the Perspective Plan	13
	III A Simulation Model for Education in Tamil Nadu ..	17
	IV School Education and Adult Education	36
	V Higher Education	43
	VI Research in Science and Technology	51
	VII Some Problems of Educational Finance	58
	VIII Planning, Administration and Management of Education, Science and Technology in Tamil Nadu	65
	IX Budget Summary and List of Projects	70
ANNEX.	I Summary of Consultation on Educational Reform in Tamil Nadu	73
	II Internal Evaluation and the Semester System	75
	III <i>Scheme</i> : Proposed Pattern of Education for Tamil Nadu.	82
	IV Organisation Chart for Education Administration ..	83

LIST OF TABLES.

NUMBER.	TABLE NO.	PAGES
1 Sources of Educational Finance	1·11. One	4
2 Tabular Summary of Student Career, 1957-72.. .. .	1·14 Two	5
3 Elementary Education (Girls) Wastage : Standards I to V.	1·14. Three	6
4 Education Wastage by Standards.. .. .	1·14. Four	7
5 Wastage by Levels	1·14. Five	8
6 Level of enrolment and Proportion of Drop-outs in School Education	3·4. One	18
7 Estimated Additional Number of School Teachers and Addi- tional Costs of Teaching Programme	3·5 Two	21
8 Average Cost of Schooling per Thousand Students	3·14. Three	26
9 Unit Cost of Schooling	3·14. Four	27
10 College Education: Costs and Numbers, 1972-73	3·22. Five	28
11 Annual Additional Costs and Numbers in College Education.	3·23. Six	29
12 Estimated Numbers of Successful Students, 1972-84 (Assump- tion) I	3·24. Seven	30
13 Continuing Education: Courses and Estimated Costs, 1974-85.	3·25 Eight	31
14 College Education : Numbers, Ratios and Costs	3·27. Nine	33
15 Estimated Number of Students Passing out Coursewise 1972-84 (Assumption I)	3·27. Ten	34
16 Estimated Number of Students Passing Out Coursewise, 1972-84 (Assumption III)	3·27. Eleven	35
17 Current and Projected Demand for Graduates and Professionals.	5·5. One	44
18 Past Outlays as between Levels of Education	7·6. One	59
19 Outlays at Education Levels in Plan	7·8. Two	59
20 Current Per-Student Cost	7·9. Three	60
21 Unit Costs of Primary Education in Chosen Countries (1961)	7·10. Four	60
22 Unit Costs in France	7·10. Five	60
23 Unit Costs	7·11. Six	60

NUMBER	TABLE NO.	PAGE
24 Economics of Re-deployment and Estimated Yields : Fresh Sources	7-16, Seven	62
25 Re-deploymnet	7-16, Eight	63
26 Proposed Plan : (i) Educational ; (ii) Non-Educational ..		72
27 Responses to Education Reform Questionnaire :—		
(i) Response Rate		73
(ii) Analysis of Responses		74

CHAPTER I.

EDUCATION, SCIENCE AND TECHNOLOGY IN TAMIL NADU IN RETROSPECT.

Objectives

1.1. The objectives of the system of Education, Science and Technology in the State have been the :

Development of the personality of the child and its discrete and harmonious growth as a member of a group bearing on its affective life and work experience ;

Understanding of the culture and history of the State, the country and the world ;

Instruction in the moral and spiritual values of the country ;

Acquisition of scientific, technical and professional skills ;

Promotion of research to push back the frontiers of knowledge and solve the technical and developmental problems faced by the State and the country ;

Democratisation of education, through meeting the growing demand for education and provision of social compensation for the condition of the poor majority of the State's population.

Achievements.

1.2 *Expansion.*—In all areas of Education, Science and Technology in the State, there has been a phenomenal quantitative expansion. In elementary education (Standards I to VIII) enrolment has increased from 30.88 lakhs in 1956-57 to 65.77 lakhs in 1971-72. The number of elementary schools has increased from 25,268 to 32,021 increasing the enrolment in the age-group 6 to 11 from 56.82 to 94.5 per cent and in the age-group 11 to 14, from 23.07 to 55.6 per cent. The number of teachers have increased from 88,331 to 1,65,658. During 1971-72 alone 2,000 new teachers' posts were sanctioned to cope with the demands of additional enrolment. All villages with a population of 300 and above have an elementary school within a mile's radius. The enrolment in secondary schools (Standards IX to XI) increased from 2.04 lakhs in 1955-57, to 7.14 lakhs in 1971-72, which works out to an enrolment percentage of 35.7 in the group 14-17; the number of secondary schools likewise from 894 to 2,699 and the teachers, from 20,483 to 59,891. Since all teachers in the primary and secondary schools have been trained, teacher training schools were decreased from 147 in 1960-61 to 135 in 1971-72. Adult literacy centres were increased from 949 in 1960-61 to 1,448 in 1971-72 at the height of a time-bound Central scheme, eighty of which continue to function in fulfilment of the unfinished programme. At present 13 out of the 14 districts of Tamil Nadu are served by the Public Library System with an aggregate of 3,340 libraries under the Public Library Act of 1948, the only exception being Kanyakumari. The free public library service has been financed from a library cess of 3 paise in the rupee levied on property and a matching grant from the State except for the City of Madras. The Connemara Public Library (which, being the copyright library for South India, also receives a copy of every book published in the country) is the State's Central Library;

there exists besides 13 district central libraries, 1,437 branch libraries, 1,883 delivery stations and six mobile libraries, making up a total of 3,340 libraries. Out-of-school-education programmes are being carried out by governmental agencies, voluntary agencies, including factories, co-operatives and religious institutions. A random survey of 16 programmes show that they are effective and have been expanding; they operate at low unit costs and face no problem of drop-outs or of employment for their trainees.

1.3 Students from Scheduled Castes increased from 6.1 to 12.1 lakhs during the same period.

1.4 Industrial training institutes increased from 10 with an intake of 3,368 students in 1961-62 to 31 with an intake of 13,112 in 1971-72. Altogether 195 industries run apprenticeship training schemes for 2,727 apprentices in 489 establishments. The 14 Technical High Schools started during the Third Plan with an intake of 840 students functioned unchanged through 1971-72. Polytechnics increased from nine with an intake of 820 in 1956 to 35 in 1971-72 with an admission of 4,642 students. In addition seven special institutes, ranging from leather technology to catering technology and applied nutrition, have been established in the State.

1.5 Arts and Science Colleges have increased from 48 to 169; correspondingly the number of students and teachers increased from 36,853 and 3,000 to 1.83 lakhs and 8,945 respectively. During this period the number of Universities increased from two to three. In addition there exist the Indian Institute of Technology. The Tamil Nadu Agricultural University and two rural institutes for higher education which enjoy the status of an University in the State and function as such. The number of Teacher Training Colleges increased from three with 300 student-teachers in 1950-51 to 23 with 3,000 student-teachers in 1971-72. The number of engineering colleges have increased from seven with an intake of 620 in 1956 to 12 with an intake of 1,6000 students as of today. Scientific research in the University has received a fillup through the establishment of four advanced centres, the fundamental engineering research establishment at the College of Engineering in Guindy and the Intensified Research Programmes in the Tamil Nadu Agricultural University and at the Indian Institute of Technology.

1.6 *Quality*.—The qualitative improvement in the system of Education, Science and Technology in the State has also made a significant beginning. In elementary education, the teacher-pupil norm was established at 20 for single-teacher schools, 30 for two-teacher Schools and 55 for the rest, though, for financial reasons, the norms have yet been realised. The principle of employing trained graduates as headmasters in higher elementary schools with a strength of 400 and above was introduced. Science teaching and equipment grants of Rs. 300 each to 8,400 elementary schools and Rs. 1,000 to each of the 1,550 higher elementary schools were made. Library grants of Rs. 60 each were made to 21,000 elementary schools and Rs. 120 each to 6,500 higher elementary schools. Houses for women teachers increased to 1,342 in 1971-72. All teachers now receive a single uniform grade of training, i.e., the secondary grade. Against 8.88 lakhs of students fed under the mid-day meal scheme in 1956-57, 18 lakh students from Standards I to VIII alone were being fed in 1971-72. In addition, free books and slates are provided to those beneficiaries of the mid-day meal scheme who study in Standards I to III. There is also a free uniform programme financed from private donations.

1.7 In secondary education, diversification has been introduced through the opening of engineering courses in 143 schools, of secretarial courses in 120 schools, of agricultural courses in 63 schools and of home science courses in 26 schools. In order to use modern science curricula, expert committees have been at work for the revision of the syllabi for standards I to XI. The revised syllabi for standards I to V have been finalised and published.

1.8 In adult literacy, a farmer's educational and functional literacy programme has been organised in 60 centres in the Udumalpet taluk and 60 centres in the Pollachi taluk. Instruction to the handicapped is imparted in 24 schools covering the entire State, except for the Dharmapuri and Nilgiris districts. The conditions of service and status of teachers have been improved through incentive increments, contributory provident fund *cum*-insurance, the introduction of selection grade post, the grant of a number of fringe benefits, such as festival advances, marriage loans and through the establishment of teachers' homes and the National Foundation of Teachers' Welfare. The curriculum for arts and science colleges is being revised and modernised, and refresher training course for teachers in these revised programmes have been organised. Tamil has been introduced as a medium of instruction for higher education and the 46 Government Colleges in which this reform has been effected offer both Tamil and English as media. The status and conditions of service of college teachers have been improved by the two State Pay Commissions. In pursuance of their recommendations, the University Grants Commission scales of pay have come into force; they also now receive the city compensatory and house rent allowances and a pension provision for their old age. In engineering education, sandwich courses, expansion and revision of both undergraduate and post-graduate courses, a curriculum development centre at the College of Engineering in Guindy, and the training of polytechnic teachers in modern techniques, and methodology at the Technical Teachers' Training Institute are a variety of measures that have progressively contributed to quality training.

1.9. *Expenditure.*—All education in Tamil Nadu is free up to the Pre-University Course and education at State expense is available for that course also. In addition 70 per cent of the 1.6 lakh students studying in arts and science colleges and the 8,200 students studying in engineering institutions are granted scholarships under one or the other of several schemes. The result is the fast mounting educational expenditure in the State, which to-day amounts to Rs. 89.85 crores in the Department of Education, Rs. 12.94 crores in the Department of Health for medical education, Rs. 0.54 crore in the Department of Agriculture for agricultural education, Rs. 8.20 crores in the Harijan Welfare and Backward Class Departments for the education of the scheduled and backward communities, Rs. 10 lakhs in the Fisheries Department for fisheries education, Rs. 1 crore in the Department of Labour on vocational education and Rs. 10 lakhs in the Women's Welfare Department on pre-primary education. Thus, out of a total State budget of Rs. 396 crores, the State expenditure on education amounts to Rs. 112.73 crores.

1.10 The State expenditure on primary education works out to a per pupil cost of Rs. 61.70; a per pupil cost in secondary education of Rs. 244.80. As for collegiate education in the sciences and arts, the figure is Rs. 542 for an aided college and Rs. 480 for a Government college. In technical education the per pupil cost in Government run polytechnics is Rs. 2,500 and Rs. 3,160 for private institutions. The corresponding figure for an engineering college is Rs. 8,600 if it is a Government institution and Rs. 8,530, if it is a private institution.

1.11. The other elements of educational expenditure, some of which are difficult to compute, can only be estimated conjecturally by arranging them sourcewise.

TABLE 1.11. ONE.

Sources of Educational Finance.

	(RUPEES IN CRORES)
1 Government of India	3.50
2 University Grants Commission	5.00
3 University recognised schemes	0.25
4 Local bodies	5.00
5 Recognised schools and colleges run by voluntary agencies	6.00
6 Unrecognised schools	0.50
7 Recognised unaided schools	0.50
8 Parents	15.00
Total ..	35.75

1.12. The total expenditure in the State on Education, Science and Technology to-day, thus amounts to Rs 148.48 crores against the net State income of Rs. 2,648.89 crores. This means that 5.61 per cent of the State's income is being expended on education.

Management.—Education planning, administration and management in the State is vested in five Directors dealing with school education, collegiate education, technical education, medical education and legal education. There are other educational areas, such as agriculture, forestry, fisheries, veterinary and approved schools which are under separate directors. Within a span of one-and-a-half decades, the original Directorate of Public Instruction has, in order to meet the growing and diversified educational activities in the State, evolved into the three Directorates of Technical Education (1957) and School and Collegiate Education (1965). Medical and Legal Education were siphoned off from the Directorate of Public Instruction in 1950. Despite the increase of the State education budget by over twenty times during the last quarter of a century, representing a very rapid rate of growth of 45 per cent per annum during the last decade, the headquarters staff of the three Directors has remained static. In accordance with sound management principles, it is the field structure which has been considerably expanded over the years. There are ten Chief Educational Officers for the fourteen districts, combining in four cases two districts as follows: the Nilgiris with Coimbatore; Tirunelveli with Kanyakumari; Salem with Dharmapuri and Madras with Chingleput. Generally speaking, each district has four District Educational Officers who operate at the educational district level and each District Educational Officer has twelve Deputy Inspectors operating at the panchayat union level. This field staff is responsible for guiding, inspecting and supervising the primary and secondary schools in their geographical areas. It is remarkable achievement that this headquarters and field structure have planned and operated the midday meal programme for 31,000 schools in the State with the addition only of one officer in the headquarters and two in the field.

In other words, the field staff have taken on this enormous and successful State programme in addition to their other heavy responsibilities. Similarly, the entire Adult Education Programme in the State has been implemented by the field staff without any addition to their personnel. The library programme at the district level is also carried out as an additional responsibility by the District Education Officer. The increasing Plan grants, particularly for buildings, during the four Five Year Plan periods have similarly been administered by the headquarters and field staff without any additional staff strength. The Directorate of Collegiate Education administers the annual U.G.C. grants of Rs. 2 crores and has been responsible for the refixation of salaries of college teachers. Its small staff has maintained its management responsibilities in relation to colleges which have increased from 79 to 169 during 1965-72. The Directorate of Technical Education has similarly, since its inception, had to cope with a doubling of management load in relation to engineering and polytechnic institutions. In addition, it has taken on the supervision of one thousand commercial educational institutions and the organisation of their curricular and their examinations with its staff limitations. Thus, the education administration in the State has to its credit a notable record of education and extra-educational achievements.

Problems.

1.13. Against this impressive record of quantitative expansion, qualitative renewal, management achievement and the generous financing of the Education, Science Technology system of the State, which provide a firm foundation for the State Plan, there are serious lacunae in the system which must also be recorded, for these serve to elicit and establish priorities for the Perspective Plan.

Wastage.

1.14. The Education, Science and Technology system in the State is throughout characterised by students dropping out of school and college and a number of these remaining behind stagnating in and repeating their courses. Educational wastage is a compound of dropping out plus repetition. In 1957-58, 8.57 lakh students entered standard I and it is revealing to trace in Table 1.14. Two what happened to this generation of students who graduated in June 1972.

TABLE 1.14. TWO.

Tabular Summary of Student Career—1957—72.

<i>Year.</i>	<i>Standard.</i>	<i>Number of students enrolled in lakhs.</i>
(1)	(2)	(3)
1957-58	I	8.74
1961-62	V	4.22
1964-65	VIII	2.54
1967-68	XI	1.66
July 1968	P.U.C.	0.59
July 1968	Teacher training and other post S.S.L.C. Courses	0.20
1972	B.A., B.Sc., B.Com., (Graduation) re-appearances	0.24
		+ 0.08

There is a particular problem of wastage in girls' education in the State at the elementary level, as shown in the following table:—

Elementary Education (Girls) : Wastage Standard— I-V.

TABLE 1.14. THREE.

<i>Year.</i>	<i>Strength of Girls in Standard I.</i>	<i>Year.</i>	<i>Strength of Girls in Standard V.</i>	<i>Per- centage.</i>	<i>Wastage.</i>
(1)	(2)	(3)	(4)	(5)	(6)
1958-59	3,80,406	1962-63	1,60,860	42.28	57.72
1959-60	4,08,405	1963-64	1,76,157	43.13	56.87
1960-61	4,34,058	1964-65	2,01,205	46.35	53.65
1961-62	5,35,005	1965-66	2,21,304	41.36	58.64
1962-63	5,83,054	1966-67	2,32,096	39.80	60.20
1963-64	6,08,567	1967-68	2,43,858	40.13	59.87
1964-65	5,81,118	1968-69	2,66,279	45.10	54.90
1965-66	5,67,327	1969-70	2,71,242	48.24	51.76
1966-67	5,85,665	1970-71	2,83,939	48.55	51.45

TABLE 1.14 FIVE.

Wastage by Levels.

(Number of students in lakhs.)

Year.			<i>In Primary.</i>	<i>In Middle.</i>	<i>Up to Middle Stage.</i>	<i>In High School Stage.</i>	<i>Up to High School Stage.</i>
	(1)	(2)	(3)	(4)	(5)	(6)	
1957-58	51.20	19.42	70.62	10.07	80.79	
1958-59	52.20	19.02	71.22	10.91	82.13	
1959-60	52.00	19.20	71.20	12.20	83.40	
1960-61	49.50	21.62	71.12	12.32	83.44	
1961-62	54.70	18.71	73.41	11.89	85.39	
1962-63	54.20	19.60	73.80	..	..
1963-64	54.20	19.83	74.03	..	..
1964-65	41.90	24.82	73.72	..	..
1965-66	48.20	..	..	..	..
1966-67	48.00	..	..	..	..
1967-68	53.18	..	..	..	..

1.15. The tables show that the most serious wastage of 51.2 per cent of those enrolled takes place in Standards I, II, III and IV. This is tragic for many reasons. First, the international definition of literacy is the equivalent of four years of primary schooling. The school wastage 51.2 per cent in the first four years means that, every year, more than half the children entering school are being added to the 60 per cent of adult illiterates in the State. The school system is paradoxically enough contributing to our growing mass illiteracy.

1.16. Secondly, there seems to be a curious relation between this 51.2 per cent wastage and the 40 per cent of people in the rural areas and 60 per cent of people in the urban areas living below the poverty line in the State as recorded in the Draft Perspective Plan-frame. That is to say, the wasters and the illiterate poor are not two classes apart; they belong to the self-same group. The question to ask here seems to be: Is education in fact being denied to the children of the poor? The causes for dropping out are linked with the causes for stagnation or repetition. In primary schools, repetition works out to 20 per cent; in secondary schools, it works out to 18 per cent and 44 per cent in P.U.C. and arts and science colleges. Stagnation is primarily due to educational causes, whereas the dropping out from school and college is primarily due to economic causes. In the Task Force's specially commissioned survey on the nature, extent and causes of drop-outs in selected rural and urban areas, dropping out from school and college has been identified as being due mainly to the pull of the home and market (farm, factory, or office), and due only secondarily to the push from the school and the college hours of schooling overlapping with the busy agricultural season. It is due also to outdated curricula, mass teaching and learning techniques and the traditional examination tests which highlight memory and intellectual weakness.

1.17. This means that the wastage of 51.2 per cent of students in the first five year of school and the dropping out of 53 per cent of students between P.U.C. and the first year of all degree courses including professional ones, which are traceable primarily to economic causes with academic ones playing a secondary role, call for an educational programme which can be carried to the places where the drop-outs live or are at work. In this context it may be noted that the term "drop-out" is pejorative, when, as often happens, it is either the school or the system which has failed to engage and hold their attention. "Push-outs" would be a more appropriate term.

1.18. In financial and skilled man-power terms, the waste in professional education is even more serious. The wastage in engineering education works out to an average of 18 per cent over a period of 10 years and that of polytechnic education, to 20 per cent. The need to reform and restructure professional education in order to avoid this sizable wastage is thus clearly urgent.

1.19. *Outdated Curricula.*—One of the causes for stagnation and repetition at all levels of the Education Science and Technology system is the nature of the curriculum and the syllabus which does not correspond to the interests and aptitudes of the individual student, the continuing explosions in information and knowledge and the specific demands of the agricultural, industrial, service and cultural sectors of Tamil society. The system constantly strives to revise and update its curricula at all stages. But here, enough is not enough. The determinant is the speed at which information, knowledge and skill demands are changing. There is thus an inbuilt hiatus between the rate of external change and the rate at which school and University curricula are being adapted in response.

1.20. *Teaching and Learning Technologies.*—A further cause for repetition and wastage in the system is the mass teaching methods that are being followed and the learning techniques centred on memorising bits and pieces of information that are forced on the student. Here again the population explosion of the '60s with the ensuing student bulge at all levels of the system makes the adaptation of modernised teaching technologies which follow the individual learning paths of the students difficult and costly. The system has to move in the direction of more individualized teacher-student relationships and some decentralisation of teaching programmes in individual institutions.

The P.U.C. Problem.

1.21. The pre-University course represents a special case of educational waste, waste of human and financial resources lost to the State, to the parents and to the students alike. It does not add significantly or irreversibly to learning ability or to the skill of a student which he has not already acquired in eleven years of sound schooling. In its present form it is a level of study where students sojourn for making time before entering the labour market or while preparing for professional courses or for higher learning. In short, the course is a "baby-sitter" for students and parents alike. Since to them there are no visible costs except those of board and lodging, which have to be paid for anyway, it is easy to overlook the waste of real scarce resources that this one-year course entails. The course cannot in its present form incorporate a purpose beyond itself nor elicit one from the student who, at that age, cannot be expected to strike out on his own and make anything of it. And in it, most prospective employers see no value added anyway. For, the market does not distinguish between a high school graduate and a P.U.C. non-completer or for that matter, a completer. As for the *length of study*

and the time element. It is too short for the teacher to teach or the student to learn any skill that can be shown to have been worth all the trouble. It is too short also for those who look upon it as the last chance in which to effect the transition from the Tamil to the English medium.

Examinations.

1.22. The system is facing a near break-down in the matter of examinations. All the efforts of teachers and students, parents and managements are directed to the single events of the examination to a point where the system has come to be rightly described as examination-dominated. The examination itself has ceased to be an evaluation of a student's general knowledge, intellectual acumen, and capacity to learn and address himself to varying situations in life. It is increasingly a harsh test of one's memory of already outdated or fast outdated facts and information. Even so, its function is negative in telling the examinees what they are not good at rather than helping them to identify their aptitudes and choose their specialisations. Of the 1,97,767 S.S.L.C. examinees in 1972, 78,645 failed to pass. Of the 48,261 B.A. B.Sc. and B.Com. examinees in 1972, 16,662 failed. The examinations diploma itself, instead of being treated as a mere certificate of good memory, is now issued as the admission card for entry into the University or as a bill of rating in the initial qualifying test for employment. Hence its apparent importance and terror. This examination element is bringing the entire system of Education, Science and Technology both in the country and in the State to a grinding halt. There is probably no more urgent task facing education than that of devising and executing a workable and relevant system of assessing the learning capacity of students and evaluating their ability on learning how to learn.

Relation to Employment.

1.23. The education wastage of the system is related to and compounded by the unemployment and the unemployability of its graduates. The 1971 live registers in the country show a 22.2 per cent increase in persons seeking employment and a 26 per cent increase of educated job seekers. Unemployment increased from 18.22 lakhs in December 1970 to 22.96 lakhs in December 1971, 12.97 lakhs of the latter figure being matriculates, 6 lakhs being undergraduates, 3.94 lakhs being post-graduates. For our State, the Perspective Plan-frame computes the current unemployed at 12 lakhs and the live registers show that, as on December 1971, 1,92,865 matriculates, graduates and post-graduates were seeking jobs. The 2,381 unemployed engineers were the immediate cause of the Rs. 12.5 lakhs State Technicians' Employment Scheme, and the special programme to employ the 600 unemployed medical graduates. The problem here is two-fold. The first relates to extra-educational factors, such as the slow rate of economic growth limiting the number of employment opportunities to the educated and the social tradition of equating employment with paid, preferably Government, employment. In this connection the organised ending of the age-long neglect of adult literacy in its functional aspects and out-of-school training programmes with their direct relevance to employment involve passing from the present *ad hoc* situation with crash programmes to one based on policy which links education with employment. The educational causes relate to the unemployability of its products, most clearly seen in the reluctance of industrialists to employ the graduates of technical engineering institutions and the continuous raising of educational qualifications for various types of unskilled and semi-skilled employment. The urgent need of relating the system of Education, Science and Technology of the State to its employment and self-employment demands and delinking formal qualification from employment criteria stand out as imperatives.

Problems of Public Libraries.

1.24. In the absence of regular feed-back and complete statistics, it is not possible to measure accurately the full value of the library service offered. Some of the shortcomings in the system as it exists at present are : the major part of the outlay on libraries is spent on staff and administration items. New books are not added frequently. There is no standardised book purchase system and the situation is further aggravated by the severe competition in the book trade. Money intended mainly for books is being spent almost entirely on newspapers and journals in many cases. The service conditions of the staff leave much to be desired because of lack of finance and planning. The posts of District Central Librarian have not been filled for a long time in a few districts. The library accommodation in most of the places is inadequate and is besides far from satisfactory. Many districts are facing near financial crises. In the absence of resources, there has been no State Plan for library development and in sum, the quality of the end service available to readers only serves to defeat the very purpose of the library movement.

Rising Costs.

1.25. The costs of education in the State are continuously rising due to the inflationary situation. Teachers' salaries and allowances have had to be raised twice on the recommendations of the Pay Commissions and for several other reasons : parity with the University Grants Commission pay scales and with comparable occupations; and the constantly rising cost of living indices. Even so the status and conditions of service of teachers have been a continual source of agitation and an important factor in lowering the quality of education. The other and more tragic facet of the rising cost of education is the disinvestment it entails. The direct unit costs to the State of primary, secondary and collegiate education have been referred to earlier. It is a simple mathematical exercise to compute how much of the Rs. 89 crores is being *wasted* through the dropping out and repetition that is taking place in the system all the time to put it more simply, 51.2 per cent of students leave the school system before the fifth year and a bare 15 per cent survive till the eleventh standard. A sum of Rs. 60 crores is being spent annually for this performance in school education. As for the Rs. 10.10 crores spent on 1.8 lakh students in the colleges including 31,500 graduates per annum, about 8,000 of them find no jobs for about two years and 12,000 accept jobs at levels of pay and responsibility much lower than those that their University education would entitle them to. Above all these is the growing financial constraint on the system. The State of Tamil Nadu has increased its education budget from Rs. 15 crores in 1961 to Rs. 89 crores in 1972 (entailing a rate of increase of over 45 per cent per annum) while the Net State Domestic Product increased at a compound rate of less than 3.5 per cent over the same period. The State cannot continue this rate of education expenditure over the Perspective Plan period without education becoming a constraint on development.

Management Bottle-necks.

1.26. The management of education in the State has faced constraints, arising **casually from the absence** of a clear definition of specific objectives of education, in terms of primary and secondary tasks, and time-bound plans and annual programmes. The lack of an evaluation machinery with the essential feed-back procedure to ensure operational efficiency, adaptation and continuity has severely restricted the management efficiency of the Department. There has also been no full-time professional machinery for the **planning of education at all levels and in all forms.** The solitary Planning Officer in **the Directorate** concerns himself with planning of approved programmes and not with

the planning of education in the State. The stabilised character of the Directorates has given rise to centralisation of administration and decision-making procedures which blur the distinctions between staff and line functions. The administration of education lags behind the needs of the State's educational growth and the rational and effective supervision and direction of the system. The problems faced in this field have been compounded by the absence of management training programmes, administration refresher courses, effective recruitment, selection and promotion procedures and the lack of probationary terms of office to assist the staff appointed already.

Conclusion.

1.27. The Tamil Nadu system of Education, Science and Technology is in retrospect a heartening one. Its achievements and weaknesses provide the basis for further advance towards making education available to all and making it relevant to the economic, social, cultural and moral demands of its society. On the basis of this retrospective assessment, of fifth plan perspectives for education now being envisioned in the Union Planning Commission and taking into consideration the results of the wide-ranging consultations with legislators, government departments, Universities, teachers, organisations and students unions in the State (summarised in Annex I to this report) one major conclusion emerges. The people do not want, for their Education, Science and Technology, more of the same. They want a change for better results.

CHAPTER II.

THE GOALS OF EDUCATION, SCIENCE AND TECHNOLOGY IN THE PERSPECTIVE PLAN.

(An educational model for Tamil Nadu)

2.1. The 12-year Perspective Plan in Education, Science and Technology, which is based on an appraisal of the system in retrospect as outlined in Chapter I, will conform to the following objectives, principles, stages, structures and programmes.

Objectives.

2.2. The present objectives of Tamil Nadu Education, Science and Technology, the development of the personality of the child; the understanding of the culture and history of the State, the country and the world; the instruction in the moral and spiritual values of the country; the acquisition of scientific, technical and professional skills; the promotion of research to push back the frontiers of knowledge and solve the technical and developmental problems faced by the State; the democratisation of education through meeting the growing demand for education and providing social compensation for the condition of the poor majority of the State's population—all these will be continued. In addition, a fresh and major objective of the system during the next twelve years will be to relate directly the right to education with the right to employment in the State and the country and to relate the various stages of the education and training system to the graded skill demands of society.

Principles.

2.3. The principles on which the educational model for the future is based are those of continuity and renovation, of sanctity of contracts (so that no one now employed will be discharged from service because of any proposed restructurisation or reform) and of gradualism so that the necessary transitional period is allowed for in the innovations proposed. To this end, the system will provide:

Complete education, free to all in the age group, 5—14;

Make the minimum skills imparted through the equivalent of four years of schooling available to all the people of Tamil Nadu; increase the enrolment of girls and reduce wastage among them;

Raise the quality of education and science at all levels;

Disaggregate the education and science system so that it corresponds to the skill demands of society and allows students multiple entry, exit and re-entry points to come into, leave the school system for employment purposes or re-enter it without being pejoratively described as drop-outs;

Co-ordinate with a view ultimately to merging in a single system of in-school and out-of-school education and training;

Provide compensatory educational facilities for the disadvantaged sections of society;

Make education and science functional and relevant to Tamil Nadu and the needs of to-day and to-morrow.

Redeploy the educational expenditure in the State from all sources—State and Central Governments, the University Grants Commission, parents and private sector—so that they are not wastefully consumed in linear expansion but become productive of educational excellence and of a purposive and efficient employment orientation.

Stages, Structures and Programmes:

2.4. The problem with the present structure is that it is too long and not long enough. It requires 11 years of schooling and six years of college education with each year consisting of 220 working days for primary, 200 working days for secondary and 180 working days for college education and each day consisting of five working hours for all of them. A second problem is that the present aggregation of the structure into three stages, 1 to 5, 6 to 8 and 9 to 11 at the school level and 1+2+2 at the college level does not conform to the needs of students or to the skills demanded by society and leads to what has been termed in Chapter I as massive drop-outs.

2.5. It is therefore proposed :

That the school course be made of ten years' duration as in the other States of the Union ensuring uniformity in curriculum and quality of education even while aiming at higher standards; that the instruction time—the number of hours and days—be extended for this purpose as appropriate. The 10-year schooling provided free to all in the State will be disaggregated into four or five stages to enable students smoothly and naturally to leave school at various points for employment or work at home and re-enter school;

That out-of-school education be provided to all who leave school before Standard IV and to the 143-lakh adult illiterates in the State as the equivalent of five years' of primary schooling ;

That the enrolment of girls be increased to equal that of boys, that the rate of wastage in their school performance be reduced through (i) functionalisation of their school curricula; (ii) a programme aimed at changing social traditions acting as a constraint on women's education; (iii) the provision of additional quarters for women teachers in rural areas; and (iv) the free distribution of clothes to girl students ;

That a gradual merging of school and out-of-school education be encompassed through the use of common curricula, teachers and instructors, buildings, equipment, libraries, laboratories and farms and other agencies which will also provide continuing education—both general instruction and vocational education—to those who need it and wish for it, through correspondence courses, evening classes, the radio and television. These programmes in both general and vocational education and training will be certified by educational diplomas;

That curricula, teaching methods and learning techniques be reformed so that they become functional to varying learning abilities, teaching technologies and to urban and rural contexts and to the economic, societal and cultural realities of Tamil Nadu. Science education at all stages will be upgraded and modernised ;

That secondary education be vocationalised and be made employment-oriented through a rapidly increased network of technical high schools, comprehensive schools and through the introduction of "streaming" from Standard VIII into various educational and vocational specialisations and through the continual entry and exit of students into and from the school, the farm, factory and office ;

That standard X become the terminating point of school education for a majority of students (as at present) who will then be able to improve and continue their skills through out-of-school and out-of-college education and training programmes;

That internal assessments be used through the school years including standard X, at which stage either a public examination of the students' general learning capacity be organised or schools be given responsibility for such an examination, under criteria and guidance to be established by the Board of Secondary Education;

That admission to higher education be on the basis of fitness and aptitude tests conducted by each institution under the guidance of a central authority referred to later;

That higher education be organised on a 2+2 or 3 structure—with two years for the intermediate course, two years for the degree, two years for post-graduate studies or three years' degree with honours. Each stage will correspond to an ascending order of skills, for which the preparatory language learning will be completed in the intermediate course, the degree and post-graduate courses being subject-centered or professional. The professional degree in medicine, agriculture, engineering, etc. will continue their present time-period;

That all undergraduate education in the State be entrusted to a statutorily constituted autonomous State Council of Academic Awards with two or three affiliating regional academic bodies or two or three new affiliating Universities. This Council or these Universities for Undergraduate Education will put into effect a system of autonomous colleges, the semester system and internal assessment procedures (For the last said, see Annex, II);

That the Universities of Madras, Annamalai and Madurai be developed into centres of excellence in post-graduate teaching and research;

That a technological University for diploma, graduate and post-graduate engineering education be started and the Tamil Nadu Agricultural University be developed as a multi faculty institution covering the animal sciences, agricultural engineering, home science, forestry, fisheries, basic sciences and humanities in addition to its existing departments in the agricultural sciences;

That scientific and development research be promoted through the starting of a—

1. Tamil Nadu Science Foundation;
2. Tamil Nadu Academy of Basic and Applied Sciences;
3. Hall of Science and Industry;
4. Information Storage and Retrieval Centre;
5. Computer Centres;
6. Centre for Ocean Engineering and Marine Sciences;
7. Institute of Management Training and Development;
8. Material Testing Bureau;
9. Centre for Automotive Engineering and Development;
10. Centre for Urban Engineering;

That an educational planning machinery be established, the State management modernised, administration decentralised with appropriate training programmes, selection and promotion procedures and a smoothly functioning grants-in-aid administration.

Finance.

2.6. Educational finance in the State presents two problems which must be resolved in the Perspective Plan. First, its rate of growth has been continuously increasing for both the State and the parents, fast reaching the ceiling level. Secondly, its present distribution and use or misuse between various levels and forms of education have involved an element of disfunctional disinvestment.

2.7. It is proposed that State finances for education be redeployed to provide :

Free education up to the terminal school standard X;

Free out-of-school education, so that the 51.2 per cent of wasters from primary school and the 60 per cent illiterate adults obtain the minimum schooling;

Improved science and craft education at school; and

Scientific and developmental research programmes and post-graduate education and research at the Universities.

It is further proposed that higher education be gradually returned to a system based on fees alongside of an extensive scholarship scheme based on merit and/or poverty as decided by a means test.

CHAPTER III.

A SIMULATION MODEL FOR EDUCATION IN TAMIL NADU.

School and Out-of-School Education.

3.1 *Assumptions.*—(i) The present 11 years' curriculum is to be covered in 10 years with appropriate upgrading in the teaching programmes.

(ii) Out-of-school education facilities are to be provided for the massive drop-outs at different levels.

(iii) The school curriculum is to be made more functional in relation to rural and urban environments.

(iv) Vocationalisation of secondary education will involve the growing differentiation of the high schools into three categories; diversified high schools, comprehensive high schools and technical high schools, which in time will develop into the latter two only.

3.2 By generating an operational Simulation Model, it is possible to estimate the probable number of admissions to various classes, the number of drop-outs, additional teaching cost, etc., for the next 12 years. The model assumes that the proposed pattern of 10 years' school education will come into force from 1974-75. The existing pattern of school education as well as the one proposed are vivified in a separate *schema*.

3.3 It can be seen from the *schema** that, during the year 1974-75, which falls in the transition period, the existing XIth standard programme will have been provided for those who were studying in the Xth standard in 1973-74. After the completion of their high school studies, these would go on to an one-year Pre-University course followed by a three-year degree course in July 1975. Those who pass out of standard X in 1974-75 under the new scheme will go on to the proposed two years' Intermediate and then to the two years' degree or three-year honours courses. Suitable revisions will accordingly be made in the syllabus for standard IX in 1973-74.

Estimates of Component Costs.

3.4 The detailed estimates of the various components of the Simulation Model are shown in Tables 3.4. One and 3.4 Two. The first table sets forth the number enrolled, the level of enrolment, the number of drop-outs for the period 1972-80 at different levels examination.

* See Annexure III.

TABLE 3·4 ONE.

Level of Enrolment and Proportion of Drop-outs in School Education.

<i>Year.</i>				<i>Level.</i>			<i>Estimated school age population.</i>	<i>Estimated number enrolled.</i>	<i>Percentage of enrolment.</i>	<i>Estimated number of drop-outs.</i>	<i>Percentage of drop-outs.</i>	
(1)				(2)			(3)	(4)	(5)	(6)	(7)	
1972	Primary School	..	..	5,803,491	5,490,102	94·60	1,921,536	35·00
					Middle School	..	..	2,630,687	1,462,662	55·60	204,773	14·00
					High School	..	..	2,549,207	910,067	35·70	72,805	8·00
1973	Primary School	..	..	5,947,040	5,768,629	97·00	1,990,177	34·50
					Middle School	..	..	2,652,328	1,621,898	61·15	223,822	13·80
					High School	..	..	2,582,836	1,014,280	39·27	79,114	7·80
1974	Primary School	..	..	5,164,376	5,164,376	100·00	1,755,887	34·00
					Middle School	..	..	2,722,688	2,134,587	78·30	290,303	13·60
					High School	..	..	2,636,300	1,267,769	48·09	96,352	7·60
1975	Primary School	..	..	5,312,912	5,312,192	100·00	1,779,584	33·50
					Middle School	..	..	2,772,152	2,273,165	82·00	304,604	13·40
					High School	..	..	2,676,672	1,367,244	51·08	101,176	7·40
1976	Primary School	..	..	5,467,736	5,467,736	100·00	1,804,352	33·00
					Middle School	..	..	2,832,692	2,424,785	85·60	320,071	13·20
					High School	..	..	2,721,606	1,417,572	54·07	105,953	7·20
1977	Primary School	..	..	5,631,124	5,631,124	100·00	1,830,115	32·50

					Middle School	..	..	..	2,904,356	2,590,686	89.20	336,789	13.00
					High School	..	..	..	2,771,076	1,581,176	57.06	110,682	7.00
1978	..	..	..	..	Primary School	..	..	..	5,802,392	5,802,392	100.00	1,856,765	32.00
					Middle School	..	..	..	2,987,200	2,772,122	92.80	1,354,831	12.80
					High School	..	.	.	2,825,096	1,696,470	60.05	115,359	61.80
1979	..	..	..	..	Primary School	..	..	..	5,981,576	5,981,576	100.00	1,912,278	31.00
					Middle School	..	.	.	3,081,167	2,970,245	96.40	374,250	12.60
					High School	.	.	.	2,883,655	1,817,856	63.04	119,978	6.90
1980	.	.	.	.	Primary School	.	.	.	6,168,640	6,168,640	100.00	1,912,278	31.00
					Middle School	.	.	.	3,186,200	3,186,200	100.00	395,088	12.40
					High School	.	.	.	2,946,740	1,945,732	66.03	124,526	6.40
1981	.	.	.	.	Primary School	.	.	.	6,363,584	6,363,584	100.00	1,940,329	30.50
					Middle School	.	.	.	3,302,412	3,203,412	100.00	402,894	12.20
					High School	.	..	..	3,014,374	2,080,521	69.02	128,992	6.20
1982	..	..	..	.	Primary School	.	.	.	6,467,764	6,467,764	100.00	1,940,329	30.00
					Middle School	.	.	.	3,403,963	3,403,963	100.00	408,475	12.00
					High School	.	.	.	3,095,151	2,228,818	72.01	133,729	6.00
1983	.	.	.	.	Primary School	.	.	.	6,547,000	6,547,000	100.00	1,964,100	30.00
					Middle School	..	..	..	3,508,136	3,508,136	100.00	420,976	12.00
					High School	..	..	..	3,183,372	2,387,529	75.00	143,251	5.00

3.5 The estimated number of additional teachers required, the estimated additional cost on buildings and equipment, and the estimated teaching cost for school and out-of-school education over the next 12 years are set forth in Table 3.5 Two.

TABLE 3·5 TWO

Estimated Additional Number of School Teachers and Additional Cost of Teaching Programme.

		(RUPEES IN LAKHS.)							
Year.	Levels.	Additional number of teachers.	Additional cost of building.	Additional cost of equipment.	Additional cost of in-school education.	Teaching cost for out of-school education.	Total additional cost of teaching.	Total additional cost of school education	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
EXISTING PATTERNS—									
1972	Primary School	6,933	425·83	41·81	158·28	....	158·28	625·92
	Middle School	3,508	192·21	46·31	128·98	....	128·98	367·50
	High School	6,116	391·46	225·09	479·15	....	479·15	1,095·70
1973	Primary School	7,527	462·35	45·40	171·85	....	171·85	679·60
	Middle School	4,825	264·33	63·69	177·39	....	177·39	505·41
	High School	3,256	208·43	119·84	255·11	....	255·11	583·38
PROPOSED PATTERN OF SCHOOL EDUCATION—									
1974	Primary School	5,496	337·56	33·14	125·47	361·18	468·65	857·35	
	Middle School	3,841	210·44	50·70	141·21	21·55	165·78	423·92	
	Diversified High School	2,626	188·08	108·72	231·43	} 7·86	274·48	595·99	
	Comprehensive High School	359	7·18	16·53	35·19				
	Technical High School	....	....	....	....
1975	Primary School	3,995	245·37	24·09	91·20	366·06	457·26	726·72	
	Middle School	4,199	230·03	55·43	154·37	22·61	176·90	462·45	
	Diversified High School	2,560	184·38	106·01	225·68	} 8·25	288·22	158·08	
	Comprehensive High School	359	7·18	16·53	35·19				
	Technical High School	187	15·60	8·97	19·00				

TABLE 3-5 Two—cont.

<i>Year.</i>	<i>Level.</i>	<i>Additional number of teachers.</i>	<i>Additional cost of buildings.</i>	<i>Additional cost of equipment.</i>	<i>Additional cost of in-school education.</i>	<i>Teaching cost for out-of school education.</i>	<i>Total additional cost of teaching.</i>	<i>Total additional cost of school education.</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1976	Primary School	4,203	258-20	25-35	95-97	371-15	467-12	750-67
	Middle School	4,594	251-68	60-64	168-90	23-76	192-67	504-98
	Diversified High School	2,713	195-36	112-33	239-12	8-64	302-05	658-03
	Comprehensive High School	355	7-18	16-53	35-19			
	Technical High School	1,187	15-60	8-97	19-09			
1977	Primary School	4,415	271-22	26-63	100-81	376-43	477-26	775-11
	Middle School	5,027	275-39	66-36	184-81	25-00	209-82	551-06
	Diversified High School	2,878	207-23	119-15	253-65	9-03	316-96	691-64
	Comprehensive High School	355	7-18	16-53	35-19			
	Technical High School	187	15-60	8-97	19-09			
1978	Primary School	4,628	284-30	27-91	105-67	381-53	487-60	759-81
	Middle School	5,498	301-18	72-57	202-11	26-34	228-46	607-21
	Diversified High School	3,056	220-03	126-52	269-32	9-41	333-02	727-86
	Comprehensive High School	359	7-18	16-53	35-19			
	Technical High School	187	15-60	8-97	19-09			
1979	Primary School	4,842	297-44	29-20	110-55	387-57	498-13	817-77
	Middle School	6,003	328-88	79-24	220-70	27-79	248-50	656-62
	Diversified High School	2,808	202-24	116-29	247-54	9-79	354-46	750-15
	Comprehensive High School	796	15-93	36-65	78-03			
	Technical High School	187	15-60	8-97	19-09			

1980	Primary School	..	..	..	..	5,055	310.52	30.49	115.41	393.35	508.77	849.78
	Middle School	..	..	..	..	6,544	358.48	86.38	240.57	29.33	269.91	714.77
	Diversified High School	2,996	215.72	124.03	264.04	}	10.16	372.85	790.80
	Comprehensive High School	..	..	..	..	812	16.25	37.37	79.56			
	Technical High School	..	..	..	..	187	15.60	8.97	19.09			
1981	Primary School	..	..	..	..	5,268	323.60	31.77	120.28	399.24	519.52	874.89
	Middle School	..	..	..	..	3,521	192.91	46.48	129.46	29.1	159.37	398.76
	Diversified High School	3,212	231.27	132.98	283.08	}	10.52	392.26	834.70
	Comprehensive High School	..	..	..	..	812	16.25	37.37	79.56			
	Technical High School	..	..	..	..	187	15.60	8.97	19.09			
1982	Primary School	..	..	..	..	2,815	172.93	16.98	64.27	399.12	463.40	653.31
	Middle School	..	..	..	..	3,077	168.57	40.62	113.12	30.33	143.46	352.65
	Diversified High School	3,634	261.66	150.45	320.28	}	10.1	429.84	920.15
	Comprehensive High School	..	..	..	..	812	16.25	37.37	79.56			
	Technical High School	..	..	..	..	187	15.60	8.97	19.09			
1983	Primary School	..	..	..	..	2,141	131.53	12.91	48.88	404.01	452.90	597.34
	Middle School	..	..	..	..	3,156	172.92	41.66	116.04	31.26	147.31	361.89
	Diversified High School	3,947	284.19	163.41	347.85	}	11.68	459.47	986.90
	Comprehensive High School	..	..	..	..	812	16.25	37.37	79.56			
	Technical High School	..	..	..	..	200	16.64	9.56	20.36			

3.6 Now to the assumptions on which these estimates have been computed.

(a) *School-Age Population*.—The existing pattern of school education, which is assumed to continue up to 1973-74, is of 11 years' duration consisting of five years of primary school, three years of middle school and three years of high school. The new scheme, which is to begin from 1974-75, is of 10 years' duration consisting of, for the moment of four years of primary school, three years of middle school and three years of high school. Since the age at entry into school is generally 5 plus and since the estimated population figures are available only in the conventional five-year age-grouping, the following interpolation formulae are used to estimate the school-age population i.e., children eligible for admission at different levels of education.

FORMULA 3.6 ONE

For Existing Pattern (up to 1973-74).

Primary School—Children aged 5 to 9.

(Standards 1 to 5)

$$= S_{5-9} = .736 \times P_{5-9} + .568 \times P_{10-14} - .104 \times P_{15-19}$$

Middle School—Children aged 10 to 12

(Standards 6 to 8)

$$= S_{10-12} = .064 \times P_{5-9} + .608 \times P_{10-14} + .056 \times P_{15-19}$$

High School—Children aged 13 to 15

(Standards 9 to 11)

$$= S_{13-15} = .056 \times P_{5-9} + .608 \times P_{10-14} + .536 \times P_{15-19}$$

Note.—Symbol S_{5-9} stands for school population with ages 5, 6, 7, 8 and 9 and also a small percentage of those aged 10 as seen in the existing school enrolment pattern. Similarly other symbols denote the concerned age-groups.

FORMULA 3.6 TWO.

For Proposed Pattern (from 1974-75).

Primary School—Children aged 5 to 8

(Standards 1 to 4)

$$= S_{5-8} = .720 \times P_{5-9} + .360 \times P_{10-14} - .080 \times P_{15-19}$$

Middle School—Children aged 9 to 11

(Standards 5 to 7)

$$= S_{9-11} = -.016 \times P_{5-9} + .560 \times P_{10-14} + .056 \times P_{15-19}$$

High School—Children aged 12 to 14

(Standards 8 to 10).

$$XI = S_{12-14} = .032 \times P_6^{-1} + .140 \times P_{10-14} + .428 \times P_{15-19}$$

Symbol S_{5-8} stands for school-age population with ages 5, 6, 7 and 8 and also a small percentage of those aged 9 as seen in the existing school enrolment pattern. Similarly other symbols denote the concerned age-groups.

3.7. These computations are based on the assumption of a three-stage schooling because current educational statistics are available only on this basis. Chapter II has proposed a disaggregation of the school system into four or five stages which should be worked out in detail by an expert group and presented to the Government.

3.8. *Number enrolled and percentage of enrolment.*—The present rate of enrolment at the primary level is 94.6 per cent (i.e. per cent of school-children aged 5 to 10 are enrolled in the primary schools). It is desired to raise this enrolment rate to 97 per cent by 1973-74 and to 100 per cent from 1974-75 onwards. In the case of middle schools, the enrolment rate for the corresponding age-group is to be raised gradually from 55.6 per cent in 1972-73 to 100 per cent in 1980-81. As regards high schools it is desired to raise the enrolment rate from the existing 35.7 per cent to 75.0 per cent in 1983-84. In the proposed pattern of ten years' school education, which is to be implemented from 1974-75 the enrolment rates in that year work out to 100 per cent for primary schools, 78.40 per cent for middle schools and 48.09 per cent for high schools. Assuming a suitable annual increase in the rates so as to achieve the target specified the number enrolled in each level is estimated as:

Formula 3.8. Three.

$$\text{Number enrolled} = \text{School-age Population} \times \text{Enrolment rate.}$$

3.9. Furthermore, as already mentioned, the existing high school system is proposed to be developed into three categories for the present, i.e., diversified high schools, comprehensive high schools and technical high schools. It is proposed to have one comprehensive high school in each of the 23 development districts by 1974-75. According to a phased programme, one comprehensive high school is to be set up in each of the 115 taluks by the end of the Fifth Plan and one in each of the 374 Blocks by the end of the Sixth Plan. The average student strength in a comprehensive high school is assumed to be about 500. At present there are 14 technical high schools in the State. By the end of the Sixth Plan it is proposed to increase this number to 150. The average student-strength in a technical high school is assumed to be about 400. The remaining high schools which are neither comprehensive nor technical will have their curriculum diversified until such time as the former becomes one or the other of the latter two. Hence the number enrolled in these cases arrived at using the following relation:—

Formula 3.9. Four.

$$\text{Number enrolled} = \text{Number of schools} \times \text{Average student-strength.}$$

3.10. The number enrolled in diversified high schools is obtained by deducting the number enrolled in comprehensive high schools and in the technical high schools from the total for that stage.

Number of drop outs and percentage of drop-outs.

3.11. The present drop out rate in the primary middle and high schools is 35 per cent, 14 per cent and 8 per cent respectively. As a result of the qualitative improvements proposed, it is planned gradually to reduce this drop-out rate to 30 per cent, 12 per cent and 6 per cent respectively during the Perspective Plan period. The number of drop-outs in each level is estimated as :

Formula 3.11. Five.

Number of drop-outs—Number enrolled \times Drop-out rate.

Additional enrolment.

3.12. The estimated number of children additionally enrolled in a particular year is arrived at by using the relation.

Formula 3.12. Six.

Additional number enrolled = Number enrolled in that year less number in a year enrolled in the preceding year.

Additional Teachers.

3.13. Using the following student-teacher ratios, the number of additional teachers required is estimated as :

Formula 3.13. Seven.

Primary School	.	.	.	37 : 1
Middle School	.	.	.	33 : 1
High School	.	.	.	32 : 1

3.14 *Additional cost on buildings and equipment.*—The estimated average cost on building and equipment per 1,000 students as given below is used to work out the additional cost on buildings and equipment on the assumption that the increase in costs over the existing rates will be about 12.5 per cent in the case of diversified high schools, about 25 per cent for comprehensive high schools and 30 per cent for technical high schools.

Table 3-14. Three.

Average cost of Schooling per 1,000 students.

Level.	Buildings.	(In lakhs of rupees) Equipment.
		(3)
(1)	(2)	(3)
(RUPEES IN LKHAS.)		
Primary School	1-660	0-163
Middle School	1,660	0-400
High School	2-000	1-150

Moreover, in the case of comprehensive high schools, it is assumed that only 25 per cent of the buildings will be new and as for the remaining 75 per cent, the demand will be met by converting the existing schools.

3.15 *Additional teaching cost.*—The average teaching cost (i.e. teachers' salaries plus recurring costs) per student per year shown below is used to estimate the additional teaching costs at school education.

Table 3-14. Four.

Unit Cost of Schooling.

Level.	<i>Average teaching cost per student per year.</i>
	(RUPEES.)
Primary School	61.70
Middle School	111.40
High School	244.80

3.16. The assumptions in regard to the increase in cost for the three categories of high schools are the same as in paragraph 3.14.

3.17. *Teaching cost of out-of-school education.*—The out-of-school education programme aims at providing 100 per cent of primary level education to all students of Tamil Nadu and opportunities of continuing education for drop-outs in the middle and high school levels. It is therefore proposed to cover, under out-of-school education, 100 per cent of primary school drop-outs, 20 per cent of middle-school drop-outs and 10 per cent of high school drop-outs. The teaching cost of the out-of-school education programme had been estimated for the period 1974-78 on the assumption that the cost of teaching per student in out-of-school education will be about one-third of the cost of in-school education.

3.18. *Total additional cost on teaching.*—This is the total of the additional teaching cost of in-school education and the teaching cost of the out-of-school education programmes.

College and out-of-college education.

3.19. *Assumptions.*—(i) The one year P.U.C will continue for the academic years 1972-73 and 1973-74 and will be replaced by the two-year intermediate course from 1974-75. Following the introduction of this intermediate course the duration of the degree course will be reduced from three to two years.

(ii) Continuing education will be provided on a large scale through part-time evening courses, correspondence courses, etc.

3.20. The simulation model for college and out-of-college education provides estimates for the following characteristics during 1972-84 :—

(i) Number of students in various courses of college education/higher education such as P.U.C./Intermediate, diploma, graduate (non-technical), post-graduate (non-technical), medical, engineering, veterinary, agriculture, law, teacher, training colleges, teacher-training schools and physical education;

(ii) number of teachers required;

(iii) number of students passed ;

(iv) cost of buildings ;

(v) cost of equipment;

(vi) teaching cost ;

(vii) cost of residential and non-residential scholarships ;

(viii) continuing education, number of students, teaching cost.

3.21 Estimated figures for the above are obtained under one of the three following assumptions :—

Assumption 1 : the total student strength in the college/higher education will increase from 2.0 lakhs in 1971-72 to 2.5 lakhs in 1983-84.

Assumption 2 : the total student strength in college/higher education will increase from 2.0 lakhs in 1971-72 to 3.0 lakhs in 1983-84;

Assumption 3 : the total student strength in college/higher education will increase from 2.0 lakhs in 1971-72 to 3.5 lakhs in 1983-84 ;

3.22. The salient features observed in the simulation model for college and out-of-college education are tabulated below. Table 3.22 Five gives for these three assumptions the estimated number of students, number of teachers, number of students who pass their examinations, cost of buildings, cost of equipment, teaching cost, cost of residential/non-residential scholarships and the total cost for 1972-73.

Table 3.22. Five.

College Education : Costs and numbers 1972-73.

(In numbers and rupees in lakhs.)

<i>Serial number and item.</i>	<i>Unit.</i>	<i>Assumption.</i>	<i>Assumption.</i>	<i>Assumption.</i>
(1)	(2)	(3)	(4)	(5)
1 Number of students	Number	2,04,158-70	2,08,326-00	2,12,498-00
2 Number of teachers	"	10,396-00	10,608-00	10,819-00
3 Number of students passed	"	78,501-00	80,102-00	81,706-00
4 Cost of buildings	Lakhs of rupees.	1,098-75	1,121-17	1,143-66
5 Cost of equipment	"	479-61	489-38	499-24
6 Teaching cost	"	1,124-08	1,147-01	1,170-00
7 Cost of scholarships	"	228-81	233-44	238-23
8 Total cost of education	"	2,931-25	2,991-00	3,051-13
9 Total number of students in 1983-84	Number.	2,50,000-00	3,00,000-00	3,50,000-00

3.23. In table No. 3.23 Six the additional number of students, teachers, cost of buildings, etc., expected in each of the succeeding years under the three different assumptions, are shown :

TABLE 3·23 SIX

Annual additional costs and numbers in college education.

(In numbers and rupees lakhs.)

<i>Serial number and item.</i>	<i>Unit.</i>	<i>Assumption.</i>	<i>Assumption.</i>	<i>Assumption.</i>
(1)	(2)	(3)	(4)	(5)
1 Additional number of students	Number	4,168·00	8,332·00	12,502·00
2 Additional number of teachers	Do.	212·00	423·00	643·00
3 Additional number of students passed ..	Do.	1,601·00	3,203·00	4,808·00
4 Additional cost of buildings	(in rupees lakhs.)	22·42	44·84	67·28
5 Additional cost of equipment	Do.	9·77	19·59	29·39
6 Additional teaching cost	Do.	22·93	45·87	68·84
7 Additional cost of scholar ships.. ..	Do.	4·63	9·34	14·03
8 Additional totalcost	Do.	59·75	119·64	179·54

TABLE 3-24 SEVEN.

ESTIMATED NUMBER OF SUCCESSFUL STUDENTS--1972-84 (ASSUMPTION TWO)

<i>Course/Year.</i>	<i>P.U.C./ Inter- mediate</i>	<i>Diploma.</i>	<i>Graduates (Non-tech- nical).</i>	<i>Post- graduates (Non-tech- nical).</i>	<i>Engineer- ing.</i>	<i>Medical.</i>	<i>Veteri- nary.</i>	<i>Agricul- tural.</i>	<i>Law.</i>	<i>Teacher Training Colleges.</i>	<i>Teacher Training Schools.</i>	<i>Physical Educa- tion.</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1972-73	54,248	916	16,729	1,408	1,733	1,174	116	156	312	2,666	312	333
1973-74	56,419	953	17,398	1,462	1,802	1,221	121	162	324	1,773	324	346
1974-75	37,169	989	22,151	1,518	1,889	1,248	157	210	506	2,879	337	359
1975-76	38,546	1,026	22,971	1,574	1,959	1,294	163	218	524	2,986	349	373
1976-77	39,923	1,063	23,792	1,631	2,029	1,341	169	226	143	3,093	362	386
1977-78	41,299	1,099	24,612	1,687	2,099	1,387	174	234	562	3,199	374	399
1978-79	42,676	1,136	25,432	1,743	2,169	1,433	180	242	581	3,306	387	413
1979-80	44,053	1,173	26,253	1,799	2,239	1,479	186	249	599	3,413	399	426
1980-81	45,429	1,209	27,073	1,856	2,309	1,526	192	257	618	3,519	412	439
1981-82	46,806	1,246	27,894	1,912	2,379	1,572	198	265	637	3,626	424	453
1982-83	48,183	1,283	28,714	1,968	2,449	1,168	204	273	656	3,733	437	466
1983-84	49,559	1,319	29,534	2,024	2,519	1,664	209	281	674	3,839	449	478

3.25 Table No. 3.25 Eight estimates the number of students studying in different courses of the out-of-college continuing education and the costs thereof.

Table 3.25 Eight.

*Continuing Education—Courses and Estimated costs 1974-85.**[In numbers (column I) and rupees lakhs (column II)]*

<i>Year.</i>	<i>Estimated number of students.</i>	<i>Total Teaching cost.</i>
1974-75	1.00	137.00
1975-76	1.20	164.40
1976-77	1.40	191.80
1977-78	1.60	219.20
1978-79	1.80	246.60
1979-80	2.00	274.00
1980-81	2.20	301.40
1981-82	2.40	328.80
1982-83	2.60	356.20
1983-84	2.80	383.60
1984-85	3.00	411.00

3.26. The methodology and the assumptions on which all the estimates bearing on college and out-of-college education are based and are discussed in the next few sections.

3.26.1 *Number of students.*—Assuming a suitable proportion of the students of a particular course to the total strength of students in all collegiate and higher education (*vide* Table 3.27 Nine), the number of students in each course is estimated for each of the three assumptions. These figures are worked out for one year P.U.C. plus a three-year degree course between 1972-74 and for the proposed two-year Intermediate and two-year degree courses from 1974-75.

3.26.2 *Number of teachers.*—Using a suitable student-teacher ratio (*vide* Table 3.27 Nine), the number of teachers required is estimated for each of the courses in collegiate/higher education for the period 1972-84.

3.26.3 *Number passed.*—The number of students who pass the final examinations in each course is estimated using the relation :

Formula 3.26 Eight.

$$\frac{\text{Number of students in a particular course} \times \text{Promotion rate.}}{\text{Number of years of study}}$$

Number of years of study

The values of promotion rates assumed for different courses are given in Table 3.27 Nine. The estimated number of graduates, engineers, doctors, etc., flowing into the labour market in each year are shown in Table 3.24 Seven, Table 3.24 Ten and Table 3.24 Eleven for the three assumptions respectively.

3.26.4. *Cost of buildings, equipment, teaching and scholarships.*—The estimated cost (in lakhs of rupees) on buildings, equipment, teaching and scholarships is obtained using the estimated average cost per student (*vide* Table 3.27 Nine). While working out the estimated cost on scholarships, it is further assumed that 10 per cent of the students will be awarded residential scholarships and 15 per cent with non-residential scholarships.

3.26.5 *Cost of continuing education.*—Continuing education will be provided on a larger scale than hitherto through part-time courses, correspondence courses, etc., starting with one lakh students in 1974-75 and increasing the number to about three lakhs by 1983-84. Since science courses do not always lend themselves to the out-of-college form of education, only arts courses, such as the P.U.C./Intermediate, B.A., B.Sc. (Mathematics); M.A., M.Sc., (Mathematics), diploma are considered. Assuming the following proportion of the students in each course to the total, the number of students in the different courses is estimated as follows:—

Formula 3.26 Nine.

<i>Course.</i>	<i>Promotion of students to the total.</i>
Intermediate	0.40
B.A., B.Sc. (Maths), B.Com.	0.10
M.A., M.Sc. (Maths.)	0.10
Law	0.10
Diploma	0.30
	1.00

3.27 Further assuming that the teaching cost per student in continuing out-of-college education would be a third of the corresponding teaching cost of regular education, the total cost of continuing out-of-college education has been estimated.

TABLE 3-27 Nine. +

COLLEGE EDUCATION : NUMBERS, RATIOS AND COSTS.

Course.	Proportion of students to total (1 year P.U.C. + 3 year degree).	Proportion of students to total (2 year intermediate + 2 year degree).	Student teacher ratio.	Promotion rate.	Cost of buildings per 1,000 students in rupees lakhs.	Cost of equipments per 1,000 students in rupees lakhs.	Teaching cost per 1,000 students in rupees lakhs.	Residential scholarship per students in rupees.	Non - residential scholarship per students in rupees.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 P.U.C. Intermediate .. ..	.372	.472	20 : 1	.70	5	2.0	3.0	600	200
2 Diploma .. ..	.022	.022	30 : 1	.60	8	3.0	3.5	700	250
3 Graduate (Non-technical) .. ..	.438	.358	20 : 1	.55	5	2.0	4.5	500	250
4 Post-graduate .. ..	.027	.027	20 : 1	.50	5	2.0	6.0	900	300
5 Engineering .. ..	.052	.042	15 : 1	.80	8	5.0	16.0	1,200	600
6 Medical .. ..	.047	.037	15 : 1	.60	8	6.0	20.0	1,500	800
7 Veterinary .. ..	.004	.004	15 : 1	.70	6	3.0	10.0	1,200	500
8 Agriculture .. ..	.005	.005	15 : 1	.75	8	5.0	18.0	1,000	400
9 Law .. ..	.009	.009	30 : 1	.50	5	0.5	6.0	900	300
10 Teacher Training (Colleges) ..	.016	.016	30 : 1	.80	5	1.0	10.0	900	300
11 Teacher Training (Schools) ..	.004	.004	20 : 1	.75	4	0.5	8.0	600	250
12 Physical Education .. ..	.004	.004	20 : 1	.80	6	2.0	8.0	800	300

TABLE 3-27 Ten.

ESTIMATED NUMBER OF COLLEGE STUDENTS PASSING OUT COURSEWISE : 1972-84 (ASSUMPTION ONE).

Course/Year.	P.U.C./ Interme- diate.	Diploma.	Graduate (Non- technical).	Post- graduate (Non- technical).	Engineer- ing.	Medical.	Veterinary.	Agricul- tural.	Law.	Teacher Traning (Colleges).	Teacher Training (Schools).	Physical Educa- tion.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1972-73	53,164	898	16,394	1,378	1,698	1,151	114	153	306	2,613	306	326
1973-74	54,249	916	16,729	1,400	1,733	1,174	116	156	312	2,666	312	333
1974-75	35,104	934	20,920	1,434	1,784	1,179	148	199	478	2,719	318	339
1975-76	35,793	953	21,330	1,462	1,819	1,202	151	203	487	2,773	324	346
1976-77	36,481	971	21,741	1,490	1,854	1,225	154	207	496	2,826	331	353
1977-78	37,169	989	22,151	1,518	1,889	1,248	157	210	506	2,879	337	350
1978-79	37,858	1,008	22,561	1,546	1,924	1,271	160	214	515	2,933	343	366
1979-80	38,546	1,026	22,971	1,574	1,959	1,294	163	218	524	2,986	349	373
1980-81	39,234	1,044	23,381	1,603	1,994	1,318	166	222	534	3,039	356	379
1981-82	39,923	1,063	23,792	1,631	2,029	1,341	169	226	543	3,093	362	386
1982-83	40,611	1,081	24,202	1,659	2,064	1,364	172	230	553	3,146	368	393
1983-84	41,299	1,099	24,612	1,687	2,099	1,387	174	234	562	3,199	374	399

TABLE 3-27 Eleven.

ESTIMATED NUMBER OF COLLEGE STUDENTS PASSING OUT COURSE WISE : 1972-84 (ASSUMPTION THREE).

Course/Year.			P.U.C./ Interme- diate.	Diploma.	Graduate (Non- technical.)	Post-Gra- duate (Non- technical.)	Engineer- ing.	Medical.	Veteri- nary.	Agricul- tural.	Law.	Teacher Training (Colleges).	Teacher Training (Schools).	Physical Educa- tion.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1972-73	55,335	924	17,063	1,434	1,768	1,198	119	159	318	2,720	318	340
1973-74	58,590	990	18,067	1,518	1,872	1,269	126	168	337	2,880	337	360
1974-75	39,235	1,044	23,381	1,603	1,995	1,318	166	222	534	3,040	356	380
1975-76	41,300	1,099	24,612	1,687	2,100	1,387	175	234	562	3,200	375	400
1976-77	43,365	1,155	25,843	1,771	2,205	1,456	183	246	590	3,360	393	420
1977-78	45,430	1,209	27,073	1,856	2,310	1,526	192	257	618	3,520	412	440
1978-79	47,495	1,264	28,304	1,940	3,415	1,595	201	269	646	3,680	431	460
1979-80	49,560	1,320	29,535	2,025	2,520	1,665	210	281	675	3,840	450	480
1980-81	51,625	1,374	30,765	2,109	2,625	1,734	218	292	703	4,000	468	500
1981-82	53,690	1,429	31,996	2,193	2,730	1,803	227	304	731	4,160	487	520
1982-83	55,755	1,485	33,226	2,278	2,835	1,873	236	316	759	4,320	506	540
1983-84	57,820	1,539	34,457	2,362	2,940	1,942	245	328	787	4,480	525	560

CHAPTER IV.

SCHOOL EDUCATION AND ADULT EDUCATION.

4.1 *Aims*.—Within the frame-work of the education objectives set forth in Chapter II, school and adult education in Tamil Nadu will conform to the following twelve specific aims :

- Restructuring of the educational pattern on meaningful and purposeful lines;
- Equalising educational opportunities and attainments ;
- Improving the effectiveness of primary education ;
- Providing for out-of-school education for drop-outs and continuing education ;
- Liquidating adult illiteracy through a programme of functional literacy education ;
- Making education science-based ;
- Introducing work experience as an integral part of general education at all levels.
- Vocationalising of secondary education ;
- Re-orienting and enriching the school curriculum ;
- Reforming the examination system and introducing new evaluative techniques ;
- Improving the quality of teacher education ; and
- Increasing the competence of educational administrators and inspectors.

PROJECT No. 1.—RESTRUCTURING SCHOOL EDUCATION—IN-SERVICE EDUCATION OF TEACHERS.

4.2. The ten-year school system with multiple entrance, exit and re-entry points will be organised provisionally on the basis of 4+3+3 with facilities for out-of-school education for school drop-outs from Standards I to IV; this structure will be further disaggregated on the basis of an expert study.

This will involve an in-service training programme for 1.65 lakhs of primary school teachers and .59 lakh of secondary school teachers during the week-ends and during the summer vacation in 135 teacher-training schools, 23 training colleges and six rural extension training centres in order that they may be equipped to cover the 11-year content in 10 years adopting new teaching techniques for the purpose.

4.3. This in-service education programme will be carried out at two levels and phased over a two-year period ending in 1974.

4.4. The secondary school teachers will be provided with in-service education in intensive courses at the teacher training colleges and schools, arts and science colleges, polytechnics and the Tamil Nadu Agricultural University within a period of 24 months.

4.5. In turn these graduate-teachers will organise in-service education courses for primary school teachers in their schools. A link between all the stages of education will thus be forged through this relay system.

4.6. Thereafter provision will be made for a continuing programme for in-service training of teachers through the State Council of Education, Research and Training in Project No. 5.

COST.

		(RUPEES IN LAKHS)	
		<i>Capital.</i>	<i>Recurring.</i>
1972-73	32.50
1973-74	80.00
Vth Plan	30.00
VIth Plan

PROJECT NO. 2.—EQUALISATION OF EDUCATION OPPORTUNITIES.

4.7.1. *Out-of-School Education for Drop-outs.*—In each rural school, one additional teacher will be appointed to organise, with the help of other teachers, out-of-school, education programmes, thus providing the equivalent of four years of schooling to the 52 per cent of children who are stagnating or have dropped out to school for work at home, field or factory. The school hours and working days will be fitted into the non-busy season in each rural area. The staffing proposed for this programme will involve redevelopment of the existing teaching force in such a manner that 2,500 teachers will form the out-of-school teaching force. They will more over be so posted that 2,500 schools in the most backward areas of the State will have one additional teacher each. For the other schools, existing teachers apprentice-teachers, unemployed teachers, retired teachers and volunteers and an additional 2,500 personnel drawn each year from among the new teacher graduates will be pressed into service. They will employ multiple forms of audio-visual aids to realize in full the intentions of the programme. This programme will also involve a revision and merging of school and out-of-school curricula and introduce in consequence, work experience in all schools, rural and urban.

4.7.2. *Girls' Education.*—In order to increase the enrolment of girls in the school system and bring up their percentage enrolment as a proportion of the total school population nearer to that of boys, the functionalisation of their school curricula and a programme aimed at changing social traditions acting as a constraint on women's education have been recommended; additional women teachers' quarters in rural areas have also been provided for in Project No. 8. A voluntary scheme of free distribution of clothes to girl students will be further intensified to persuade them to attend school more regularly. In this area the local bodies will be invited to make special efforts to subsidize this facility from their general funds. The massive cultural programme for the State will contain special features—to be put forth through lectures, plays and radio broadcasts—aimed at bringing about a change in social attitudes. In the criteria employed in choosing teachers for State and national awards, special credit will attach to efforts made by individuals in extending girls' enrolment. The functionalisation of the curricula provided for in Project No. 6 will meet the special interests of girl's education and make the school more relevant to their needs.

COST.

(RUPEES IN LAKHS.)

								<i>Capital.</i>	<i>Recurring</i>
1972-73
1973-74
Vth Plan	20.19.20
VIth Plan	21.83.35

PROJECT NO. 3.—FUNCTIONAL LITERACY PROGRAMME.

4.8. A five-year functional literacy programme will be launched and be followed by a programme of continuing education for the newly literate adults. In the first five years 40,000 literacy centres will be set up, each centre giving two courses a year of four months' duration. The curriculum and study programme for each centre will be developed by the nearest teacher training school, college or rural extension training centre. Each institution will produce for its neighbouring community a text of 600 to 700 words to be used by the farmer, worker, parent, health centre, etc., and will vary with the age group, occupation and environment of the adult. There will thus be not less than 400 functional literacy texts around which this programme will operate. It will be preceded by a one-week training for the teachers of the 40,000 literacy centres.

4.9. This programme will be followed up in the remaining seven years by continuing education with emphasis on agricultural extension, health, education, vocational training, co-operative education and education for democracy.

4.10. These two programmes will be linked with the out-of-school programme for the primary school leading to a gradual merger.

COST.

(IN RUPEES LAKHS.)

								<i>Capital.</i>	<i>Recurring.</i>
1972-73	...	...	...	...	...	...	...	..	..
1973-74	...	...	...	...	...	...	...	..	..
Vth Plan	...	...	...	...	...	...	...	100	250
VIth Plan	...	...	...	...	...	...	...	50	300

PROJECT NO. 4.—VOCATIONALISATION OF SECONDARY EDUCATION.

4.11. The close relation between the school, the home, the farm and the factory suggested for education at the primary stage through the gradual merging of school and out-of-school education, which makes work experience a part of the learning process, will be continued at the secondary level through the vocationalisation of secondary education to be effected in the following manner.

4.11.1. Comprehensive high schools will be established starting with one for each development district and so increasing them that, by the end of the Fifth Plan, each taluk, will have one such school and that each block will have one school by the end of the Perspective Plan period. Either new schools will be set up for this purpose or the existing schools modified.

4.11.2. Technical high schools, now numbering 14, will be increased by opening 150 schools in 100 areas prone to industrial development. These schools, which students will enter after standards VII, will specialise in various integrated courses in general education and intensive practical training.

4.11.3. In the remaining high schools, which will eventually become "comprehensive" or "technical" high schools, diversified courses will be retained. They will be reorganised with suitable curricula slanted to vocational education of three years' duration.

4.11.4. The 31 I.T.Is., to which admissions are permitted after standard VIII under the existing system and after standard VII under the proposed system, will be part of the programme of vocationalisation of secondary education. Its management will be transferred to the Education Department. These will be increased threefold during the Perspective Plan period.

4.11.5. An out-of-school education programme will provide a two way study and training relationship. On the one hand, those who have dropped out of school between standards V and X and are in employment will be enabled to continue their general vocational education. On the other hand, those who continue in school will receive out-of-school training in Industries, Farms, Co-operative, Industrial Training Institutes, Technical Schools and Polytechnics.

COST.

(ROPEES IN LAKES).

							<i>Capital.</i>	<i>Recurring.</i>
1972-73	...	...	...	...	...	...	...	...
1973-74	...	...	...	...	...	...	...	...
Vth Plan	...	...	...	...	...	...	785.69	684.56
VIth Plan	...	...	...	...	...	...	3,273.82	3,218.13

PROJECT NO. 5. DEVELOPMENT OF THE PUBLIC LIBRARY SYSTEM.

4.12. To create an effective library service through a phased programme in the rural and urban areas of the State by the end of 1984, the following guidelines are suggested. The population density per square kilometre is expected to increase by 1980 to 39 against the present 20. The library services should therefore prepare for this increase in population and for the consequent increase in demand for library services. The network of libraries of all types with their varied and specialised functions should be made so flexible as to allow the free movement of librarians from one type of library to another, and from one district to another. Above all, the service should be equipped to meet the development needs of Tamil Nadu. Service points of reasonable size, adequate resources and allocation of funds, suitable reading material, qualified staff, an enlightened management, a plan of development and periodical evaluation will greatly contribute to the success of the system and its service to the public.

4.13. The Madras Public Libraries Act (1948) should be revised and re-issued to make provisions for the following :—

A separate Directorate of Public Libraries;

The Directorate to be headed by a professionally qualified practising librarian with not less than a Master's Degree in Library Science and sufficient experience as a librarian;

The librarian of the District Central Library to be the secretary of the local library authority thereby relieving the District Educational Officer of his extra burden so that he may find more time for regular work in the educational sphere.

A separate cadre for librarians to be known as the Tamil Nadu Library Service to be formed as distinct from the State Education Service;

The salary and status of librarians to be made comparable with those in the other educational and professional services in the State.

Increase of the library cess from five to ten paise per rupee in due course but before the end of the Sixth Plan.

4.14. Furthermore the cess collected will be reserved for the purchase of reading material, the payment of rent, staff salaries, etc., capital expenditure on buildings, furniture and equipment will be met from out of grants received from the Central and the State Governments.

COST.

							(RUPEES IN LAKHS.)	
							Capital.	Recurring.
1972-73	..	..	..	--	--	--	--	--
1973-74	..	..	..	..	..	--	3.00	5.00
Vth Plan	..	..	..	..	..	--	26.00	37.00
VIth Plan	..	..	..	..	..	--	21.00	42.00

PROJECT No. 6—QUALITATIVE IMPROVEMENT.

4.15. Equalisation of educational achievements, curriculum renewal, science updating, examination reform, improved teacher education and out-of-school education and training.

4.16. A State Council of Educational Research and Training will be established as a statutory and autonomous body to undertake action-oriented research. It will be generally responsible for the continuing qualitative improvement of school and out-of-school education its findings and the results of its activities generally will be widely publicized.

4.17. Its main programmes will include :

Demonstration research and studies for equalising educational achievements through a system of compensatory education for the first generation of entrants into the school system through on-instructional programmes specially designed for them.

Constant reappraisal and renovation of the school curriculum with a view to promoting thinking, reasoning, experimentation and a spirit of innovation in pupils.

Functionalisation of the curriculum to serve urban and rural life, and ensure a balance among the academic disciplines, craft work and moral instruction. The social science curricula will be renovated. Provision will also be made in the curriculum for health nutrition, population education, education for national integration and international understanding. The school and out-of-school curricula will be co-ordinated with a view to their ultimate merger.

This programme of curriculum renewal will involve decentralisation of the application and development of curricula to individual schools and the setting up, in each education district of a curriculum study centre.

Science updating will involve the development of integrated science programmes at the primary stage, and the determination of the stage at which science should be taught as a separate discipline. Science teaching in high schools will be made laboratory-oriented, with improved syllabi, upgraded text-books and training guides. The continuing reorientation of science teaching will be ensured through the institution of science refresher courses, workshops, etc.

Examination reform will be based on the principle that evaluation is an integral part of goal-oriented learning, schools will therefore be requested to define clearly their goals in terms of individual pupil development and the teaching programmes will be planned accordingly. The system of evaluation would then take into account the individual pupil's learning abilities and achievements including his non-scholastic activities, such as initiative, innovation, sports and library work.

Every care will be taken first to improve the academic aspect of evaluation and support this by effective and adequate administrative procedures which are commensurate in their statistical refinement with the needs of the task. The replacement and reform of the school final examination should be based on the results of continuing internal assessment within the school. A model of the semester system and a programme for internal evaluation which forms Annex II to this report discusses the merits and requirements of the new system as it is worked in the Institute of Technology. Further work will, however, be necessary to determine its applicability to arts and science colleges and to secondary school courses. If it is, details and variations will need to be worked out.

Continuing research in improved teacher education which is the corner-stone, on which the strength of Tamil Nadu's education edifice rests, will involve an accelerated programme for in-service education of teachers established under Project No. 1 the upgrading of the teacher training institutions and Universities, the establishment of extension wings in the teacher training colleges and the restoration of the status of the teacher in accordance with the Unesco/I.L.O. Recommendation. The use of individual learning methods and updated teaching technologies will involve the adequate use of all available education technologies in the State including books, films, the radio, television, the strict application of the teacher-pupil ratios already established and 220 working days for all schools with eight periods a day of 40 minutes each. The school hours and the shift system will be varied to suit local conditions, rural as well as urban.

All out-of-school education and training programmes will be under the Tamil Nadu Board of Adult Education, with the Minister for Education as Chairman. He will co-opt representatives of the school system, University, industry and agriculture, technical education and voluntary agencies as members. The State Council of Educational Research

and Training will undertake research and formulate programmes on all forms of out-of-school education, their expansion, updating and gradual merger with school curricula, and on-teaching and learning technologies and the two-way flow of information and knowledge as between them.

							COST.	
							(IN-RUPEES LAKHS.)	
							<i>Capital.</i>	<i>Recurring.</i>
1972-73	..	..	..	..	..	..	..	..
1973-74	..	..	..	..	..	..	..	..
Vth Plan	..	..	..	..	..	500	500	
VIth Plan	..	..	..	..	..	300	500	

PROJECT No. 7. PRE-PRIMARY SCHOOLING.

4.18. Local bodies, voluntary agencies and private enterprise will be encouraged to increase the aggregate number of pre-primary, Montessori, Kindergarten and Kuzhandaigal Kappagam establishments from the present 1,500 to 15,000 before the end of the Perspective Plan period. The State will provide the usual grants-in-aid plus matching grants for building and equipment where needed. The Health Plan (Project No. 41) provides for the financing of feeding programmes for pre-school children in the pre-primary sections. The education programme will be conducted by existing teachers trained in pre-primary methods in those teacher training schools which are not now engaged in secondary grade training.

							COST.	
							(IN RUPEES LAKHS.)	
							<i>Capital.</i>	<i>Recurring.</i>
1972-73	..	..	..	..	..	..	..	..
1973-74	..	..	..	..	..	..	..	..
Vth Plan	..	..	..	..	..	405.00	81.00	
VIth Plan	..	..	..	..	..	405.00	81.00	

PROJECT No. 8. EXPANSION OF SCHOOL EDUCATION.

4.19. On the basis of the forecasts of the additional number of students who will be entering primary and secondary schools during the Perspective Plan period as estimated in the simulation model in Chapter III, provision is made for additional primary and secondary schools; for the correction of physical deficiencies in the schools; and for additional housing quarters for women teachers in the rural areas.

							COST.	
							(IN RUPEES LAKHS.)	
							<i>Capital.</i>	<i>Recurring.</i>
1972-73	..	..	..	..	..	..	..	..
1973-74	..	..	..	..	..	..	..	..
Vth Plan	..	..	..	..	..	3,319.46	1,990.43	
VIth Plan	..	..	..	..	..	3,631.19	2,415.15	

CHAPTER V.

HIGHER EDUCATION.

5.1. *Aims.*—Within the general framework of the objectives for all education in the State, higher education will aim at training the highly skilled man-power which will be needed for its economic and social development and which will contribute to the advancement of knowledge. It will also include a system of general and professional undergraduate education which will provide the middle-level man-power needed by the economy. Higher education has also larger cultural purposes—to help, in particular, in the development of a secular culture within the framework of social tradition on the one hand and the needs of a rapidly changing State and country on the other.

5.2. Two priorities have accordingly been proposed in the Perspective Plan: (a) primary education and out-of-school education for drop-outs and illiterate adults; and (b) post-graduate education and research in all the sciences and technologies.

5.3. *Man-power Projections.*—In the area of higher education, the demand for highly skilled and middle-level man-power is decisive in determining the provision of higher education facilities in the State. It is recommended that the Education Planning Cell, to be referred to later, will, in co-operation with the Man-power Board proposed in the report of the Task Force on Human Resources, undertake as a first task a computation of the prospective demand for highly skilled and middle-level personnel during the Perspective Plan period.

5.4. One simple method of computing the demand for B.As. and B.Sc.s. will be to (i) assume that the stock of B.As. and B.Sc.s. will increase in proportion to the growth of economy; (ii) employ the rate of growth for the economy as a whole and by sectors as projected in the Perspective Plan; (iii) assume an annual productivity increase for B.As. and B.Sc.s. by a factor to be determined; (iv) compute the increment in each year's demand for B.As. and B.Sc.s. by a factor which is arrived at by dividing the annual growth rate of the economy by the annual productivity growth rate of graduates. The total number of B.As. and B.Sc.s. (N.) needed for each year can then be computed using the following formula :

FORMULA 5.4. ONE.

$$N = T \left\{ \frac{V}{P} (R + I) - I \right\}$$

N = fresh graduates needed.

T = total stock of graduates needed in the work force.

V = annual growth rate expressed as a factor.

P = annual productivity growth rate expressed as a factor.

R = annual attrition rate expressed as a percentage.

I = existing number of graduates in the labour force.

5.5. Pending such detailed computations, the following tentative estimates of the demand for various types of skilled graduates from institutions of highest education have been arrived at—based on the recent demand trends for graduates and proposals for the rate of increased growth in the primary, secondary and tertiary sectors of the Perspective Plan.

TABLE 5.5 ONE.

Current and Projected Demand for Graduates and Professionals.

<i>Qualification.</i>	<i>Demand by 1972-74.</i>	<i>Fifth Plan.</i>	<i>Sixth Plan.</i>
(1)	(2)	(3)	(4)
1. B. As., B. Scs. for office, commercial, industrial and agricultural establishment posts	20,000	75,000	1,00,000
2. M. As., M. Scs., Ph.Ds. for education, scientific research and executive posts	2,000	10,000	15,000
3. Teachers with I.T.Is. and Technical High Schools ..	1,000	6,000	6,000
4. Polytechnics	4,500	20,000	25,000
5. Engineers	2,000	10,000	15,000
6. Doctors	1,200	7,000	10,000
7. Agricultural graduates	1,000	5,000	6,000

5.6. These estimates, interim and tentative as they are, reveal clearly the need to ensure that the annual admissions to the B.A. and B.Sc. courses are progressively brought within the range of employment prospects which can be envisioned for the Fifth and Sixth Plans.

5.7. *Features.*—There is need for regulation of the optimum size of the typical arts and science college. Equally, it is necessary to ensure the full utilization of buildings, equipment and man power in each of these colleges. The present five to six hours daily utilization of these facilities represents a serious waste. Fuller utilization would therefore mean a second shift for laboratory and classroom use, evening classes and correspondence courses in a wider combination of disciplines and curricular offerings. A fresh look should be had at the general question of higher education for women—and indeed at specific issues such as separate higher educational institutions for them—in the light of general economic considerations and man-power needs. A National or State service for all students in institutions of higher learning should be organised as a means of bringing academic means and economic needs closer together. The Nation's and State's commitment to a secular society should be reflected in the organization and management of all higher institutions and in the first contact of the student body as a corpus with social reality—brought about under the aegis of these institutions of higher learning. It is a stage for the lighting of the torch. Each generation of students will bear it forward. The flame will progressively illumine the recesses of the mind and will generally be productive of engulfing brilliance that will always remain the aim of higher education.

**PROJECT NO. 9: STATE COUNCIL OF ACADEMIC AWARDS OR UNDER
GRADUATE UNIVERSITIES.**

5.8. Undergraduate and graduate education will be reorganised into a two years course for the intermediate and two years for the B.A., B.Sc., or B.Com. degree and three years for the same degrees with honours. The M.A., M.Sc., and M.Com. courses will continue to be of two years' duration and will be offered in the autonomous colleges to be referred to later. An autonomous State Council of Academic Awards together with two or three affiliating regional bodies or two or three new Undergraduate Universities, will be set by statute. It will be responsible for the recognition and supervision of all colleges in the State and for implementing the following reforms:

A system of selective admissions to all affiliated colleges on the basis of tests to be devised and administered by each college under overall norms and criteria that will be established by the Council or by the Universities. This will also serve to contain the dimension of the serious problem of the over-supply of graduates in relation to estimated demand. Furthermore, during the Fifth Plan, no new colleges for the liberal arts should in principle be established in view of the fuller utilization of the existing colleges proposed earlier;

A system of autonomous colleges as recommended by the 1966 Education (Kothari) Commission under which a certain number of colleges were to be granted autonomy in the development of courses of study and methods of teaching and learning from the intermediate to the M.A., M.Sc., and M.Com. levels. The later post-graduate courses will be controlled by the State's three Universities as envisaged in Project No. 10.

The semester system now in operation in the professional colleges in the State will be extended to all the colleges affiliated to the Council or the Universities;

The present examinations will be replaced by a system of internal assessment and supplemented by external evaluation. The report of on "Semesters and Internal Assessment" in Annex II contains an outline of the proposed system;

The curricula and syllabi in the arts and sciences will be continually reviewed and updated with the help of the appropriate specialist staff from the three post-graduate Universities. In particular, the B.Sc. programme should be modified to become a broad science degree covering mathematics, physics, chemistry, the life and social sciences. Annual refresher training programmes will be organised in this revised curriculum. A special expert group will be set up to examine and recommend the development of all stages of **economics education and the rationalisation and correlation of such education with such professional courses of study as commerce, company law and banking education.** Another expert group should be set up to review and recommend an enlarged base of study for the first integrated degree course in social sciences.

Out-of-school education and training programmes, extension courses involving work experience through service in the Community Development Projects, functional literacy centres and rural extension services and through skill-training in factories, technical institutions and workshops will be organised for the benefit of college students. Similarly, **correspondence courses, evening classes, radio and television instruction for those who are in employment and wish to acquire further higher education will also be provided.**

5.9. In addition to providing for the administrative costs of the State Council or the Universities, and grants to autonomous colleges, provision is made for half the additional costs of fellowships to be distributed on the basis of merit and poverty, the costs are as computed under Assumption 1 of the Table 3.23. Six-half the costs for running out of college education, as set forth in Table 3.25 Eight, will also be borne by it.

COST.

Year.	(IN RUPEES LAKHS).	
	Capital.	Recurrin .
(1)	(2)	(3)
1972-73 .. .. .	..	..
1973-74 .. .. .	..	..
Fifth Plan	100	1,500
Sixth Plan	100	1,825

PROJECT NO. 10. POST-GRADUATE UNIVERSITIES OF MADRAS,
ANNAMALAI AND MADURAI.

5.10. The three Universities of Madras, Annamalai and Madurai will be developed into post-graduate centres of excellence. They will provide post-graduate education in the arts and sciences and expand and intensify their programme of research. This will involve creating additional facilities in the faculties of the physical sciences, as also in mathematics, life sciences, earth sciences and the Science of the atmosphere. In the social sciences, it will involve the creation of three or four additional professorships in each of the departmentals of economics, politics, history and statistics. A new Department of Education devoted to educational research and the training of professors for teacher training colleges will be created in Madras and Madurai Universities. Each University will be governed by a council composed of the heads of departments.

COST.

Year.	(IN RUPEES LAKHS.)	
	Capital.	Recurring.
(1)	(2)	(3)
1972-73 .. .. .	..	..
1973-74 .. .. .	..	..
Fifth Plan	630	442
Sixth Plan	145	92

Note.—The cost estimates for Projects Nos. 9 and 10 amounting to Rs. 48 crores will also benefit from the re-deployment of the Rs. 105 crores being annually expended on the three Universities.

PROJECT NO. 11. MADRAS UNIVERSITY OF TECHNOLOGY,
TAMIL NADU.

5.11. The Madras University of Technology which will be established under the Tamil Nadu Plan will be composed of the following 11 institutions and the 36 polytechnics :—

- (i) College of Engineering, Guindy.
- (ii) A.C. College of Technology, Madras.
- (iii) Government College of Technology, Coimbatore.
- (iv) Government College of Engineering, Salem.
- (v) Alagappa College of Engineering and Technology, Karaikudi.
- (vi) P.S.G. College of Technology, Coimbatore.
- (vii) Coimbatore Institute of Technology, Coimbatore.
- (viii) Thyagaraja College of Engineering, Madurai.
- (ix) Regional Engineering College, Tiruchirappalli.
- (x) Madras Institute of Technology, Madras.
- (xi) College of Engineering, Annamalai University.

5.12. In addition, the University will be responsible for the 36 polytechnics.

5.13. The University with its main campus at the College of Engineering, Guindy, will establish a system of constituent, autonomous and affiliated colleges and will assess the engineering man-power needs of the State, organise advanced study and research programmes, develop curricula and all types of instruction materials, and promote standards in the engineering profession. It will have a faculty of engineering and technology, a faculty of sciences and a faculty of social and management sciences.

5.14. The 36 existing polytechnics will be maintained, and in order to keep pace with the changing requirements of the times, and the changing demands made on these institutions in consequence, new courses will be introduced in administration, civil engineering and buildings, and electrical, electronic, food, mechanical, textile and vehicle technologies. Polytechnic programmes of the relevant faculties will be oriented to agricultural practice. Industry-polytechnic co-operation will be promoted through periodic sandwich programmes. The polytechnic will be allowed to develop into autonomous institutions as recommended by the National (Damodaran) Committee on Polytechnics and the growth of its faculties will also be fostered in the manner prescribed by that committee.

COST.

<i>Year.</i>	<i>Capital.</i>	<i>Recurring.</i>
(1)	(2)	(3)
(IN RUPEES LAKHS.)		
1972-73 .. .. .	..	..
1973-74	5.00	5.00
Fifth Plan	511.00	547.50
Sixth Plan	400.00	580.00

PROJECT NO. 12. THE TAMIL NADU AGRICULTURAL UNIVERSITY.

5.15. The Tamil Nadu Agricultural University will continue its development plan for the integration of its teaching, research and extension activities in the two existing agricultural colleges and five research stations. The Annamalai University College of Agriculture will become part of the new University. The teaching programme will be reorganised and placed under the trimester and internal evaluation system for both undergraduate and post-graduate students. Greater emphasis will be laid on specialisation at undergraduate and post-graduate levels along with strong foundation courses in the basic sciences and humanities. The research activities of the staff employed in the University will be more field-oriented and they will seek to find solutions for the problems of farmers. During the Perspective Plan period, an Agricultural Engineering College, a Fisheries College, a Home Science, an Animal Sciences College, another Agricultural College and a Faculty of Basic Sciences and Humanities will be established. Several new departments in the agricultural faculty and a few newer faculties will be added.

COST.

Year.	RUPEES IN LAKHS	
	Capital.	Recurring.
(1)	(2)	(3)
1972-73	10	30
1973-74	10	30
Fifth Plan	200	250
Sixth Plan	200	300

PROJECT NO. 13. LIBRARY AND DOCUMENTATION DEVELOPMENT.

5.16. The Connemera Public Library and the Tamil Nadu Archives will be improved and developed during the Perspective Plan period. Greater co-ordination between the different manuscript libraries, such as the Saraswathi Mahal Library in Thanjavur, the U. V. Swaminathayer Library in Adyar, and the Oriental Manuscripts Library in Madras, will be promoted. To provide a stimulus to the production and distribution of books of all kinds, scientific, cultural, national and international, a Tamil Nadu Book Development Council will be formed as a State branch of the National Book Development Council.

5.17. *Documentation, Information Storage and Retrieval.*—The four fold objectives of the Centre will be to:

Provide a documentation service to the industries in the State;

Act as a clearing-house, particularly to the State Government, for information on all aspects of the industries in the State;

Act as a central information storage and retrieval agent to disseminate information on new articles through documentation notes and S.D.I. services among scientists, technologists and research workers;

Act as a partner in the integrated development of the different documentation systems in the State as a whole.

5.18. The work and service of the State Centre should be well co-ordinated with that of other agencies in India with similar objectives and offering similar or related types of services. Moreover, the work and services of the local units should be co-ordinated one with the other and with those of the Centre. This is necessary for the following reasons :—

The wide range of coverage of subjects falling within its purview ;

The wide variety of sources and languages from which information has to be abstracted ;

The variety of communication media through which information may flow in ;

The specificity and comprehensiveness to be ensured in answering queries ;

The ever-growing range and complexity in the subjects covered ; and

The need to ensure economy and productivity at all levels of its work.

5.19. The development programme of the State Centre may be conveniently carried out in three successive phases, two of which fall within the Perspective Plan period.

Phase 1—1972-73 to 1976-77.

Phase 2—1977-78 to 1981-82.

Phase 3—1982-83 to 1986-87.

It will consist of six divisions; a Library Division, a Documentation Division; a Retrieval Division; a Liaison Division; an Education and Research Division and Administration.

5.20. The advisory service provided at the State Centre will seek to help industrial enterprises in setting up library and documentation units in their respective organisations. continuous and sustained research in documentation will aim at the improvement of existing techniques and designing of new ones. It will answer bibliographical enquiries, supply photo-copies and translations to scientists and research workers of available literature. (108,599 titles of back journals and 6,150 titles of current periodicals are held by 60 libraries within the city itself.) It will have access to a computer centre and maintain an unified catalogue of scientific periodicals and employ qualified scrutinisers, professionals and translators with language-cum-subject specialisations.

COST.

Year	Cost.	
	Capital.	Recurring.
	(RUPEES IN LAKHS.)	
1972-73	..	..
1973-74	3.00	5.00
7 Plan	26.07	37.24
V Plan	21.15	42.02

PROJECT NO. 14. INTERNATIONAL INSTITUTE FOR TAMIL STUDIES.

5.21. The International Institute for Tamil Studies will be further strengthened, expanded and developed so as to promote research in the Tamil language, literature and culture and in the relationship of other languages to Tamil. It will be equipped to train Indian and foreign scholars in Tamil. The Institute will develop four research departments, in addition to its well-established documentation and library services, and a programme of research and training. It will issue a journal of Tamil Studies.

COST.

Year.	(RUPEES IN LAKHS.)	
	Capital.	Recurring.
(1)	(2)	(3)
1972-73 .. .. .	..	..
1973-74	25	10
Vth Plan	10	55
VIth Plan	10	60

CHAPTER VI.

RESEARCH IN SCIENCE AND TECHNOLOGY.

6.1. *Research and Policy Aims.*—In planning for research in science and technology in Tamil Nadu, the following factors are taken into account. The land, water, mineral and fuel resources of Tamil Nadu are limited compared to those of many other States in India. Its population density is high being nearly twice the all-India average. As against this, it is better placed than many other States in the matter of literacy, general levels of education and it is better off with its supply of skilled man-power. It has a citizenry with strong predilection to order and discipline. The State can boast of a wide spectrum of talent ranging from great dexterity and nimbleness of hand to capacity for sustained mental effort. Its human-talent potential is extremely favourable to economic growth.

6.2. In recent years, major break-throughs have been effected in many areas of science and technology and these have brought human society to the threshold of an era, in which the economic prosperity of a society can be built even in the absence of locally available conventional resources. The quality and quantity of knowledge that a society has accumulated and is capable of creating has become an influential factor of artefact growth. "To know that and to know how" have become factors of production.

6.3. Since progress in medicine and agriculture depends on the level of development in science and technology, State policy should recognise the need for a significant investment in education and research bearing on these. Conscious efforts should be made to promote research and development in those areas that deal with process materials and non-conventional energy sources. To this end, a State education and science policy should include the following features and projects in addition to those outlined in Chapters II to V. The State should accordingly create, maintain and expand, as and when found necessary, facilities for advanced studies, research and development in science and technology. There must be at least one or two strong **centres of excellence** in every important constituent area of scientific and technological knowledge in the State.

6.4. The State should create and maintain such organisations as may be necessary to evaluate continuously the status of contemporary science and technology elsewhere in the world—in education, research and applied effects. These institutions will advise the Government in measures necessary to that end; they will offer advice and approve programmes involving the development of new laboratories, the extension of existing only and aid departments of State in the investigation of the feasibility of its developmental projects. The State should initiate measures to foster creativity and the progressive employment of scientific methods and technological tools.

PROJECT NO. 15. TAMIL NADU SCIENCE FOUNDATION.

6.5. The Tamil Nadu Science Foundation will be established as an autonomous body by State legislation and given an annual block grant. The foundation will promote science and technology in the State through financial support of scientific projects and studies of natural resources, particularly in new fields of research endeavour which are of importance to the State.

Assist existing institutions on a project basis and in the organisation and initial support of the new laboratories; and

Keep under review the advance of science and technology in the State.

6.6. The foundation will have seven divisions : 1. Mathematical and physical sciences; 2. Engineering sciences, 3. Biological sciences, 4. Inter-disciplinary programmes, 5. Natural and human resources, 6. Social sciences and 7. Documentation.

COST.

Year.	(RUPEES IN LAKHS.)	
	Capital.	Recurring.
(1)	(2)	(3)
1972-73 .. .. .	..	..
1973-74	5	2
V Plan .. .. .	..	500
VI Plan .. .. .	..	655

PROJECT NO. 16. TAMIL NADU ACADEMY OF BASIC AND APPLIED SCIENCES.

6.7. The Tamil Nadu Academy of Basic and Applied Sciences will be founded by State charter and will be called upon.

To act as an advisory body to the Government of Tamil Nadu in relevant matters of science and technology ;

To promote co-ordination between various societies, institutions and departments of science and technology in the State and publish proceedings, journals, members, transactions, monographs, news-letters and other publications. To this end, the Academy will (a) review periodically the state of education and research in agriculture, veterinary science and medicine in the State; (b) provide help and guidance to the Government in formulating a sciences and technology policy; (c) recommend research projects as a support for these at faculty and inter-disciplinary levels; (d) recommend grants for specialised equipment and organisation of special courses that have an applied relevance to the needs of the State; (e) advise the State on educational programmes in science and technology at all levels; and (f) offer facilities for organising seminars, symposia, conferences at State, national and international levels.

6.8. The Academy will consist of 400 members and honorary members. Before the inauguration of the Academy, 100 founding members and 25 honorary members will be nominated. Twenty-five members will be elected annually. The nominations and elections shall be from among persons of eminence in Tamil Nadu in the fields of basic and applied sciences.

COST.

Year.	(RUPEES IN LAKHS.)	
	Capital.	Recurring.
(1)	(2)	(3)
1972-73 .. .. .	..	..
1973-74	5.00	2.00
V Plan .. .. .	..	10.00
VI Plan .. .. .	..	10.50

PROJECT NO. 17 HALL OF SCIENCE AND INDUSTRY IN TAMIL NADU.

6.9. A Hall of Science and Industry will be established at a suitable place in Madras City in order to :

Portray the growth of science and technology and their application in industry and human welfare;

Popularise science and technology in urban and rural areas for the benefit of students and common men;

Supplement science education in schools and colleges assist their science departments in planning science museums and train their teachers in improvising science-teaching aids;

Design, develop and fabricate demonstration equipment ;

Conduct research in the history of science and technology; and

Collect restore and preserve important historical objects which represent landmarks in the development of science, technology and industry.

6.10. The initial organisation will comprise sections for popular physics, chemistry of the elements, motive power, electrical power and communications, transport health and nutrition sciences, the technologies of Tamil Nadu's industries such as textiles, automobiles, leather, lignite and agricultural farming. A planetarium will be set up as an adjunct to the Hall.

6.11. The Hall will have a children's gallery and will promote science clubs, hobby, centres, scientific lecture programmes and film shows as a means of popularising science. In turn it will organise regional science centres in other urban and rural areas and arrange mobile science exhibitions.

COST.

Year.	Capital.	Recurring.
	(2)	(3)
(1)	(RUPEES IN LAKHS.)	
1972-73 .. .. .	..	..
1973-74 .. .. .	..	..
V Plan	40.00	20.00
VI Plan	46.95	36.50

PROJECT NO. 18. COMPUTER CENTRES.

6.12. To promote the growth of the computer population in Tamil Nadu, the computer facilities at the College of Engineering in Guindy will be expanded and a computer centre set up, during the Fifth Plan, in Coimbatore with its concentration of industry, education and research establishments. During the Sixth Plan, feasibility studies will be undertaken in Madurai and Tiruchirappalli with a view to establishing computers in those two cities during the Seventh Plan. The main functions of the Madras and Coimbatore Centres will be to provide :

Computer science facilities for the M.Sc. course and training facilities to the 1,400 fourth year engineering undergraduates ;

Training programmes for the State Directorates of Town Planning, Technical Education and Rural Development, the Slum Clearance and Electricity Boards and the Finance and Public Health Departments ;

Training of personnel from industry and agriculture in the application and use of computers for research, design inventory control and management. The Centre will thus meet the entire data-processing needs of the Government and other institutions in the State. The Centre will, after the Fifth Plan, become self-supporting.

COST.

Year.	Capital.	Recurring.
	(2)	(3)
(1)	(RUPEES IN LAKHS.)	
1972-73		
1973-74	4.00	0.50
V Plan	60.00	16.25
VI Plan	60.00	33.75

PROJECT NO. 19, CENTRE OF OCEAN ENGINEERING AND MARINE SCIENCES.

6.13. A centre of Ocean Engineering and Marine Sciences will be established to undertake studies of the marine environment the principles of ocean engineering underwater mining in coastal waters along the continental shelf and the deep-sea floor and of marine resources management. Its ocean research programme will include :

- Investigation into the anchoring and stabilisation of pipe-lines and structures;
- Investigation into the extent strength and movement of ocean sediments;
- Investigation of the stresses arising from waves and ocean currents on underwater structures; and

Studies on the dispersion of pollutants using dyes and underwater photography.

6.14. The Centre will eventually become an important tool in the intensive exploitation of 800 km. of the Tamil Nadu coast-line and its hidden resources.

COST.

Year.	Capital.	Recurring.
	(2)	(4)
(1)	(RUPEES IN LAKHS.)	
1972-73		
1973-74	9	2
V Plan	9	25
VI Plan		25

6.15. There are five other projects sequentially related to the above which have been recommended and whose financing does not strictly fall within the education science and technology area. The State Planning Commission should examine these projects and decide where they should be located and how they should be financed.

PROJECT NO. 20. INSTITUTE OF MANAGEMENT.

6.16. An Institute of Management Training and Development of Tamil Nadu will be established—

- to provide basic education in management problems;
- to train and develop managers for various Government departments and agencies ;
- to provide consultancy services in all management spheres;
- to undertake sponsored research projects from Government and industrial organisations ;
- to undertake empirical research and to develop indigenous case and other material;
- and
- to promote management techniques and methods appropriate to the small-scale as well as agro-based industrial units.

6.17. The Institute will fill a serious gap in State amenities for research and training of supervisory personnel and middle and high-level executives. The University Department of Management should be merged in this Institute.

Cost.

Year.	Capital.	Recurring.
(1)	(2)	(3)
	(RUPEES IN LAKHS.)	
1972-73 .. .. .	..	..
1973-74	5.00	3.00
V Plan	30.00	75.00
VI Plan	22.50	145.00

6.18. A substantial part of the annual recurring expenditure of the Institute may be met from fees accruing from consultancy and sponsored research programmes and from the fees collected for the executive development programme. This revenue, it is expected will amount to Rs. 10 lakhs per year.

PROJECT NO. 21. MATERIALS TESTING BUREAU.

6.19. A Materials Testing Bureau will be established at Madras to undertake test investigations on materials products and processes of technological and engineering significance. Its main functions will be—

- to assess the quality and performance of engineering goods objectively ;
- to assess the quality of engineering materials ;
- to assess the propriety and quality of engineering and technological processes ;
- to conduct tests in collaboration with the Indian Standards Institution and other standards-inspecting bodies and issue certificates based on these tests ;
- to develop standards in collaboration with the above bodies ; and

to guide engineering industries in the development of their products and the improvement of their quality.

6.20. It will operate through seven initial divisions (buildings, chemicals, consumer products, mechanical engineering, electro-technical, structurals, metals and textiles).

Cost.

<i>Year.</i> (1)	<i>Capital.</i> (2)	<i>Recurring.</i> (3)
	(RUPEES IN LAKHS.)	
1972-73 .. .. .	..	..
1973-74 .. .. .	..	..
V Plan	43	50
VI Plan	27	75

6.21. The recurring cost will be met from the testing fees to be charged by the Bureau.

PROJECT NO. 22. CENTRE OF AUTOMOTIVE ENGINEERING AND DEVELOPMENT.

6.22. A Centre of Automotive Engineering and Development will be established in collaboration with Tamil Nadu's large automotive and ancillary industries with a 20-mile test track for testing vehicles. The functions of the Centre will be—

to provide modern testing facilities for complete automotive vehicles as well as for component parts. The term automotive includes, besides automobiles, tractors, bulldozers, heavy earth-moving machines, scooters, three-wheelers, etc.;

to provide research and developmental facilities in automotive engineering ;

to serve as a forum for technical discussion ;

to serve as a clearing-house of information and publish a newsletter/journal ;

to serve initially as a nucleus which will be developed ultimately into a national facility ;

to induct professionals and technicians into scientific investigations in this area and to enable them to appreciate and evaluate their own work better.

Cost.

<i>Year.</i> (1)	<i>Capital.</i> (2)	<i>Recurring.</i> (3)
	(RUPEES IN LAKHS).	
1972-73 .. .. .	..	..
1973-74	10.00	3.00
V Plan	30.00	40.00
VI Plan	8.50	54.00

PROJECT NO. 23. CENTRE FOR URBAN ENGINEERING.

6.23. A Centre for Urban Engineering, which will take over the Department of Traffic Engineering at the College of Engineering in Guindy and expand it, will be established. It will deal with all the complex problems of urban transportation, urban housing and urban environment. Its main functions will be :—

to train high-level personnel in urban engineering, urban transportation, urban housing and urban environment ;

to co-ordinate the facilities available in various institutions and formulate inter-disciplinary programmes for the benefit of the trainees in urban engineering ;

to conduct field surveys and collect factual data in the urban areas of the State ;

to be associated at the required levels in metropolitan planning in the State ;

to offer considered solutions for specific problems of urban development referred to the Centre for by the State Government and local bodies.

COST.

Year.	Capital.	Recurring.
	(RUPEES IN LAKHS.)	
1972-73	..	..
1973-74	5	2
V Plan	5	10
VI Plan	..	10

CHAPTER VII.

Some problems of Educational Finance.

7.1 The financing of education in Tamil Nadu raises five issues, viz., the desirable global investment in education for the State; the public sources of educational finance, the distribution of educational expenditures among levels of education, the unit costs of education; and the deployment and re-deployment of financial resources.

Global investment in educational.

7.2 The total educational investment in Tamil Nadu has been computed in Chapter I at Rs. 148.48 crores for 1971-72 which represents an investment of 5.61 per cent of the net State Domestic Product of Rs. 2,648.89 crores. Of this Rs. 148.48 crores, the public expenditure on education (originating from the State Government, the Central Government the University Grants Commission and local bodies) amounts to Rs. 126.23 crores constituting 4.77 per cent of the State income. The All-India discussions in the Union Planning Commission have centred round the figure of five to six per cent of the National Income as a desirable target-investment in education for the country during the Fifth Plan.

7.3 Given the present and prospective state of development of Tamil Nadu, it is recommended that public educational expenditure might move from the present 4.77 per cent to 5 per cent of the State income during the Perspective Plan period. On the basis of the income projections made by the State Planning Commission, this would mean an average of public expenditure of Rs. 175 crores per annum in the Fifth Plan and an average of Rs. 250 crores per annum in the Sixth Plan.

Public Sources of Educational Finance.

7.4 The public sources of educational finance are (a) the State Government, (b) the local bodies, (c) the Central Government, and (d) the University Grants Commission. At present the distribution of public educational expenditures as between these four sources, is as follows :—

	(IN CRORES OF RUPEES.)
State Government ..	89.85
Central Government ..	3.50
University Grants Commission	5.00
Local Bodies	5.00

The percentage proportion of each source to the total is 86.94; 3.39; 4.84; 4.84.

7.5 These figures evidence a financial overburden on the State Government and an inadequate contribution from the Central Government and local bodies. The external benefits of the State outlay on education are not easy to identify and have not been computed. However, any recoupment for the outflow has certainly not been consciously designed to continue and regulate the flow of skilled man-power exclusively into the State economy. It will also be noted that industry, as the largest consumer of skilled man-power, is making no direct contribution to education. It is recommended therefore that an expert study by an Education Finance Commission to be proposed later, be made of all the financial sources other than the State Government with a view to enlarging these contributions during the Perspective Plan period.

Distribution between levels.

7.6. The distribution of expenditure between the various levels of education in Tamil Nadu as percentage of the total budgeted outlay, has been as follows:—

TABLE 7-6 ONE.

Past Outlays at levels of Education as Percentages of Total.

	1st Five-Year Plan.	2nd Five-Year Plan.	3rd Five-Year Plan.	3 Annual Plans.
(1)	(2)	(3)	(4)	(5)
Elementary Education	79.27	72.72	61.01	54.87
Secondary Education	14.17	23.14	26.99	33.19
Other Educational Schemes	5.14	2.85	11.00	4.36
University Education	1.42	1.29	1.00	7.58
	1969-70	1970-71	1971-72 Budget.	1972-73 Budget.
Elementary Education	38.18	48.77	46.73	46.35
Secondary Education	31.04	21.22	23.61	22.54
Other Educational Schemes	8.46	8.76	6.05	5.87
University Education	22.31	21.25	23.62	25.24

7.7 The figures above manifest a trend and show a steady decline in the proportion of expenditure on elementary education to the total, which has fallen from 79.27 per cent in the First Plan period to 38.18 per cent in 1969-70 and stands at 46.35 per cent in 1972-73. University and other education has been the largest proportionate increases from 6.56 per cent of the total in the First Plan to 31.11 per cent in 1972-73. Relatively, secondary education has maintained a steady growth from over 14 per cent to over 22 per cent. This distribution of expenditures as between levels of education is the product of history and has involved a relative decline in primary education and a relative expansion in the liberal arts and University education. The Perspective Plan attempts to correct these trends.

7.8 The priorities in the Plan are at the lowest and highest levels, viz., the minimum general education for all, and educational excellence at the post-graduate and research levels. The Perspective Plan for Education, Science and Technology accordingly proposes the following distribution:—

TABLE 7-8 TWO.

Plan Outlays at Education Levels.

	(IN RUPES LAKHS.)	
	Amount.	Percentage of total.
(1)	(2)	(3)
Pre-elementary and Elementary .. .. .	..	..
Secondary	11,616.84	33.76
Undergraduate Education	3,289.25	9.56
Post-Graduate Education and Research	4,661.78	13.55

Unit cost.

7.9. The recurrent unit cost of education is a concept beset with many complexities and when applied to Tamil Nadu, it gives the following breakdown as between levels :—

TABLE 7-9 THREE.

Current Per-student Cost.

	RS.	P.
Primary School	61	70
Upper Primary School	111	40
Secondary School	244	80
Aided Arts and Science College	542	00
Government Arts and Science College	480	00
Ploytechnic	2,500	00
Engineering College	8,600	00
Medical College	10,000	00
Agricultural College	7,000	00

7.10. In terms of world standards, these costs are not high.

TABLE 7-10. FOUR.

Unit Costs of primary Education in Chosen Countries (1961).

Country.	Unit Costs.
(1)	(2)
	(IN RUPEES)
Cameroon	131.26
Central African Republic	186.99
Chad	162.22
Dahomey	475.56
Galion	307.51
Mauritania	548.20
Upper Volta	373.97

TABLE 7.10. FIVE.
Unit Costs in France.

Level of Education.	1952.	1959.	1964.
(1)	(2)	(3)	(4)
	(IN RUPREES.)		
Primary School	381.25	467.50	722.50
Secondary School	1,972.50	2,157.50	3,235.00
Technical High School	2 168.75	2,680.00	3,383.75
Universities	1,718.75	2,905.00	3 827.50

7.11. However the Tamil Nadu costs are high in relation to the forecasts made by the Education (Kothari) Commission.

TABLE 7.11. SIX.
Unit Costs.

Year.	Average annual salary per teacher.	Number of pupils per teacher.	Percentage proportion (non-teacher to teacher costs).	Average annual Cost.		
				Due to teacher costs.	Due to non-teacher costs.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Primary Education—1975-76	1,800	40	50.0	50	25	74
Lower Primary Education—1975-76	1,800	50	20.0	43	9	52
Higher Primary Education—1975-76	2,100	35	20.2	73	14	87
Lower Secondary Education (General)—1975-76		25	33.3	152	51	203
Lower Secondary Education (Vocational)—1975-76						500
Higher Secondary Education—(General) 1975-76	4,500	20	33.3	272	91	363
Higher Secondary Education (Vocational)—1975-76						700

7.12. It will be seen that the unit costs at every level of education in Tamil Nadu today are well above the forecasts made for a period three years from now. It is necessary therefore that a careful examination be made of the unit costs particularly in secondary and professional education in order to effect economics.

7.13. In this connection, particular attention may be paid, as suggested by the Education Commission, to the following components of education costs :—

- Construction of school buildings;
- Better designing of local equipment and sharing of sophisticated equipment;
- Increasing working days and reducing vacations;
- Enhanced industry, integrity and dedication on the part of the staff.

Re-deployment of Funds.

7.14. There is considerable scope for deployment and re-deployment of present educational expenditures in the State. Educational finance should be tailored to meet the changing priorities and patterns of education. Educational tradition tends to cast its finances in rigid, inflexible, and therefore, uneconomic moulds. Education outlays in various forms and at levels of education, and the subjects and objects of expenditure should be constantly reviewed, adjustments made and effective utilisation ensured. Educational expansion should not be an additive process nor should increments of educational quality and excellence call proportionately for additional expenditures. In contemporaneous educational finance, there are, for example, some ten areas where effective economics can be attained without slowing down quantitative expansion or arresting qualitative development. The areas of economy and re-deployment proposed here are illustrative rather than definitive. A fuller exploration of these in the light of State policy by the Education Finance Commission proposed later is therefore, recommended. Based on the above limits, it is proposed to free 100 high schools to develop their own standards and have them run like the matriculation schools on a fee-based system. It is also proposed to levy a small cess on industry and agriculture and to make higher education progressively fee-based.

7.15. In this context the Union Planning Commission discussions indicate a consensus in favour of an approach to University education along three directions :—

(a) Talented persons needed for the development of the country should be identified and educated free of cost; similarly; students from the under-privileged classes should be given free educations;

(b) to satisfy the democratic urge for higher education, a large number of correspondence courses, where *per capita* costs are low, should be started;

(c) from the other students, who seek admission for term-time education in regular institutions, the full cost of University education should be recovered.

7.16. As an illustration in the re-deployment exercise based on the above principle, an amount of Rs. 14 crores in the Tamil Nadu State Government budget could be re-distributed along the following lines :—

TABLE 7-16. SEVEN.

Economics of Re-deployment and Estimated Yields—Fresh Sources.

	(RUPEES IN CRORES.)
(i) Discontinuation of grants to 100 high schools and making them fee-based like matriculation schools.	2-00
(ii) Merging of uneconomic high schools and imposing a ban on starting uneconomic institutions.	1-00

	(RUPEES IN CRORES)
(iii) Merging of uneconomic higher elementary schools and imposing a ban on starting of uneconomic institutions.	1.00
(iv) Panchayat Union contribution to be fixed at 15 per cent of elementary education expenditure.	2.00
(v) Conversion of basic into non-basic types and discontinuation of stipends for training schools.	0.50
(vi) Fees in training colleges (23) and physical training colleges (3)	0.75
(vii) Discontinuation of the compensation grant for P.U.C. to be replaced by Intermediate.	1.00
(viii) Decrease in grants to colleges through raising of fees by 50 per cent—	
Aided Colleges	1.75
Government Colleges	0.75
	} 2.50
(ix) Education cess on industry and agriculture (755 large industries Rs. 10,000+10,943 small industries×Rs. 1,000+a levy on large agricultural plantations and farms.)	3.00
(x) Rationalised Administration	0.25
Total Rs. ..	<u>14.00</u>

TABLE 7.16. EIGHT.

Re-deployment.

	(RUPEES IN CRORES)
(i) Continuous in-service training of teachers for schooling	1.50
(ii) Transfer of better qualified teachers from the 11-year pattern to 10-year schooling No extra expenditure involved.	..
(iii) Out-of school education for five-year schooling	3.50
Secondary grade teachers transferred from class VIII of high schools+ new teachers for continuing education	1.50
For adult literacy	1.50
	} 3.00
(iv) For compensatory education for students from poor families in :—	
High Schools	1.50
Colleges	1.50
	} 3.00
(v) For freeships and award of living allowances in addition to the Harijan Welfare and Backward Class scholarships.	1.00
(vi) For developmental research and strengthening the State Council of Educational Research and Training.	2.00
Total ..	<u>14.00</u>

7.17. In the above re-deployment of Rs. 14 crores the two new items not so far considered are: Rs. 3 crores to be incurred as compensation expenditure for students from the poorer sector and Rs. 1 crore to be paid as freeships and living allowances exclusive of those already in force. Other suggested expenditures would relieve the budget authority of the strain of raising fresh revenues for education. In other words the financial distinction between plan and non-plan expenditure and, indeed, that between developmental and non-developmental expenditure will have no meaning in the financing of the educational reforms proposed. Such reforms will be financed both from Plan sources and by the re-deployment of committed expenditures in the non-Plan budget so called. It is educational reform and renovation which is the centre-piece of this Plan edifice. It is the keystone that locks the other members of the arch into place. Its financing from both Plan and non-Plan sources is a consequence.

7.18. In conclusion of this plan of reform, it is recommended that the State Government appoint an Educational Finance Commission to review educational expenditures in the State and recommend their re-deployment in the light of the objectives and aims proposed for this system and State policy generally.

CHAPTER VIII.

Planning, Administration and Management of Education, Science and Technology in Tamil Nadu.

AIMS.

8.1. The planning, management and administration of Education, Science and Technology in the State will be reorganised to conform to the overall objectives set forth in Chapter I and the specific aims, programmes and methods recommended in Chapter III to VII. There is need for a continuous review of the administration and management machinery so that it keeps abreast of the changing needs and patterns of education, science and technology.

PROJECT NO. 24—EDUCATION PLANNING CELL FOR TAMIL NADU

8.2. An Education Planning Cell for Tamil Nadu located in the office of the Secretary to the Government in the Education Department will be established. The cell will :

Keep under review the relationship between the various stages and levels of education;

Examine the content of education at various levels with a view to recommending their adaptation to the integral development of the student's personality and the socio-economic and cultural needs of society;

Examine the unit costs of education at various levels and stages with a view to achieving economy—efficiency and quality;

Recommends structural changes and adaptation of the inputs at the various levels of education—particularly those at the secondary and higher and professional levels—on the basis of the man-power demands to be established by the proposed Man-power Board;

Propose programmes for adult literacy and adult education designed to meet the skill-demands of the State;

Recommend an integral relationship between school and out-of-school education;

Keep under continuing review the management and administration of education; and

Assist in the co-ordination of education at all levels, taking into consideration the plans for medical, veterinary and agricultural education.

8.3. The Cell's titular head will be the Secretary to the Government to the Education Department. It will be staffed by an educationist-cum-economist who will be the executive head, a senior education specialist, a statistician and a systems analyst.

COST.

	<i>Year.</i>	<i>Capital.</i>	<i>Recurring</i>
		(RUPEES IN LAKHS)	
1972-73
1973-74	1.00	2.00
Vth Plan	1.00	60.00
Vth Plan	1.50	75.40

**PROJECT NO. 25.—ADMINISTRATION AND MANAGEMENT OF
EDUCATION, CULTURE, SCIENCE AND TECHNOLOGY.**

Organisation.

8.4. For the administration and management of education, culture, science and technology, it is recommended that, under the Minister and Secretary, six directorates be created :

- (1) the Tamil Nadu Science Foundation;
- (2) the State Council of Educational Research and Training;
- (3) the Directorate of School and Out-of-school Education;
- (4) the Directorate of Collegiate Education;
- (5) the Directorate of Technical Education; and
- (6) the Directorate of Libraries.

8.5.1. The Tamil Nadu Science Foundation will have seven divisions as recommended in Chapter VI, each headed by a scientist of the rank of a Joint Director.

8.5.2. The State Council of Educational Research and Training (S.C.E.R.T) headed by an outstanding educationist as Director, will have the following seven divisions, each of which will, in turn, be headed by a professor in the rank of a Joint Director and dealing with : teacher training; curriculum; equalisation of education; the co-ordination of school and out-of-school education; the science institute; educational technology and evaluation.

The State Institute of Education will be merged in the State Council of Educational Research and Training and become its teacher training wing.

8.5.3. The Directorate of School and Out-of-school Education will have an advisory wing of five divisions dealing with personnel, finance, elementary and out-of-school education, cultural promotion and vocational education, each headed by a Joint Director. It will also have an executive wing with four divisions each headed by a Joint Director. The Joint Directors of the two circles will have two Deputy Directors and 10 Regional Deputy Directors working under them, each of whom will, in turn, have an advisory wing of five special officers and an executive wing of five District Education Officers and fifty Assistant Education Officers per district.

8.5.4. The existing office of the Director of Collegiate Education will be continued and act as the government's executive arm in the State Council of Academic Awards or the Universities.

8.5.5. The office of the Director of Technical Education will continue to act as the government's executive agency in the Madras University of Technology. The organisation chart, which follows from these recommendations, is found in Annex IV.

8.5.6. The Directorate of Libraries, which will professionalise the public libraries of Tamil Nadu, will be established along the lines set forth in Chapter III.

School and Out-of-school Management.

8.6. The Department of School and Out-of-school Education will unify all school and out-of-school activities in primary and secondary education. The basic function of its Director will be the integration and co-ordination of its four advisory divisions and its three executive divisions. At all levels, the advisory and executive wings will maintain their separate identity. Decisions relating to various areas will be the responsibility of the Joint Directors, with the Director intervening in their work only when co-ordination and integration are called for. Two divisions, one each for elementary education and out-of-school education, are being created in the advisory wing in order to advise the executive wing on the curricula, teaching and training methods of elementary schools and on out-of-school education for drop-outs, these are the new unified functions recommended in Chapter IV.

8.7. Another new division for cultural programmes and physical education is recommended in the advisory wing in order to promote in-school and out-of-school adult programmes, the development of Tamil music, drama, poetry, painting, to ensure the participation of the rural and urban communities in Tamil Nadu's adventure of development. A third new division in the advisory wing will concern itself with vocational education. It will have important promotional responsibilities for the vocationalisation of secondary education, the oversight of technical high schools as well as the I.T.I.'s which will become the responsibility of this department.

8.8. In view of the large number of school and out-of-school programmes proposed, the State will be divided into two geographical areas, each to be placed under the care of a Joint Director. Each circle will have five Regional Deputy Directors who will hold charge over an area roughly the size of a revenue district. The Regional Deputy Directorate will have an advisory wing of five special (staff) officers, one each for examinations, inspection science, out-of-school education and physical education and culture and an executive line wing staffed by five District Education Officers, assisted by 50 Assistant Education Officers. The posts of Inspectress of Girls' Schools and the Inspectress of Anglo-Indian Schools will be abolished and the Regional Deputy Director will re-assign this work to one of his officers.

8.9. An advisory committee to assist the Director of School and Out-of-school Education has also been recommended and it will consist of all the Joint Directors to ensure co-ordination in resolving departmental conflicts. This will also be an important instrument in securing participative management.

8.10. The following principles are implicit in the above recommendations and will be translated into executive orders to the extent necessary and possible.

8.10.1. The Director will be concerned only with advising the Government on policy, and for the rest, he will possess only co-ordination and integration functions.

8.10.2. Decision-making will be strictly decentralised in accordance with the executiveline functions recommended. Each officer—the Assistant Education Officer, the Special Officer, the District Education Officer, the Regional Deputy Director and the Joint Director—will have his decision-making powers clearly established and will be held responsible for executing them without interference. In particular the locus of decision-making power in the Department of School and out-of school Education will be in the Regional Deputy Directors who are posted in the districts

Personnel Recruitment, Training and Management.

8.11.1. Recruitment and appointment policy should be tailored to meet the specialised needs of the six departments. The positions in the Tamil Nadu Science Foundation, the Department of Libraries and the State Council of Educational Research and Training will be filled by academics of the highest quality and standing.

8.11.2. All executive staff will be provided with periodic management training and refresher courses.

8.11.3. The District Education Officers will be trained to play the new roles of educational planner and professional leader in addition to being executives and supervisors. A judicious blend of promotion and direct recruitment of first-rate young men for the posts of D.E.Os. will be the basic policy. A sandwich pattern of training, which will comprise a six months' foundational course at S.C.E.R.T., followed by a practical training of three months' duration in the National Staff College, will be organised for State Education Service probationers. The practical training for direct recruits for the post of Assistant Education Officers will include a month's training in departmental organisation and rules at S.C.E.R.T., a month in office of the Deputy Inspector of Schools, and a finally a month each in the D.E.O's office and at the new Regional Deputy Director's office.

8.11.4. Planning and implementation of personnel policies will be entrusted to administrators who have a social science background and are trained in management.

8.11.5. The grievance procedure for educational staff will be simplified and a grievance tribunal will be attached to each circle. A time-limit should be set for the settlement of disputes. In view of the abolition of the system of confidential reports in the State Government, there is a need to introduce an open assessment system. The personnel department will be required to evolve such a system for the sake of objective evaluation, rewarding of efficiency and determining of the training needs of personnel in the Education Department.

Financial Procedures.

8.12.1. In financial management the major emphasis will be on the optional employment of scarce resources rather than on legal and procedural accountability. The simplification and rationalisation of all administrative procedures, ranging from grants-in-aid to the placing of purchase orders, will be effected.

8.12.2. In accordance with these principles, it is recommended that the Madras Grant-in-Aid Code, the Madras Educational Rules, the Madras Elementary Education Act, and the rules framed thereunder, and the Madras Educational Inspection Code be revised to code greater autonomy to the institutions and to bring about a speedier implementation of the above rules and regulations.

8.12.3. An effective system of performance budgeting will be developed in all the six directorates. In the School and Out-of-school Education Directorate, Regional Deputy Directors will be treated for purposes of financial management as cost or responsibility centres. Financial efficiency should be measured in terms of activity levels and variances.

Administration.

8.13.1. The six directorates will be located in separate campuses with adequate infrastructure, inter-communications, modern filing systems, etc., to promote efficiency and economy.

8.13.2. The expenditure on vehicles of the Department of Education needing repairs is now approved by the State Transport Department. Instead, these powers could be vested in the Director of Education, who could scrutinise quotations with the help of an automobile engineer.

8.13.3. The procedures for maintenance and repairs of buildings in educational institutions, which is the responsibility of the Public Works Department, are in need of improvement. The problem is more than procedural and calls for considerable public and private investment each year on buildings for schools, colleges and hostels. It is therefore proposed that a School Building Research and Development Division be established in the Department of School and Out-of-School Education wherein engineers and educators will work together to plan effective and economical buildings for educational institutions and to maintain them with efficiency.

Integration at Village Level.

8.14.1. At the village level, the Panchayat Union and the Education Department should co-ordinate their functions effectively, especially so where mid-day meals are concerned. The Block Development Officer and the Extension Officer (Education), who have adequate physical facilities like transport, will assist in the distribution of mid-day meals to school-children. A nutritive dry lunch (which, because it is prepared, could be more nutritive) will take the place of the conventional lunch now being provided. More vitaminised and more nutritive food will be made available to school-children at reduced costs. This would help reduce the cost of the central kitchen, inventory and storage.

8.14.2. The medical inspection and the nutritional requirements of school-children are important, but not now given their due. The Health Department will integrate its functions with those of the Education Department at field level to ensure that such services like regular medical inspection, preventive care against infectious diseases and nutritional services are provided to school pupils as part of a single service.

COST.

						(RUPEES IN LAKHS.)	
<i>Year.</i>						<i>Capital.</i>	<i>Recurring.</i>
1972-73	..	..	..	..	..	..	..
1973-74	..	..	..	..	..	..	..
Vth Plan	..	..	..	..	27	190	
VIth Plan	..	..	..	..	5	210	

CHAPTER IX.

BUDGET SUMMARY AND LIST OF PROJECTS.

Project number.	Name of project and its occurrence in text pages.	Capital.				Recurring.				Total
		1972-73.	1973-74.	Vth Plan.	VIth Plan.	1972-73.	1973-74.	Vth Plan.	VIth Plan.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(RUPEES IN LAKHS.)										
1	In-service Education of Teachers (pp. 44-45) ..	..	..	..	..	..	..	30.00	..	142.50
2	Equalisation of Educational Opportunities : Out-of-School Education for Drop-outs (pp. 45-46.)	..	..	..	..	..	..	2,019.20	2,183.35	4,202.55
3	Functional Literacy Programme (pp. 46-47) ..	..	..	100.00	50.00	..	..	250.00	300.00	700.00
4	Vocationalisation of Secondary Education (pp. 47-48).	..	..	785.69	3,273.82	..	..	684.56	3,218.13	7,962.20
5	Development of the Public Library System (pp. 48-49).	..	3.00	26.00	21.00	..	5.00	37.00	42.00	134.00
6	*Qualitative Improvement (pp. 49-51) .. ..	..	..	500.00	300.00	..	..	500.00	500.00	1,800.00
7	Pre-primary Education (p. 52) .. ..	..	..	405.00	405.00	..	..	81.00	81.00	972.00
8	Expansion of School Education (p. 52) ..	..	..	3,319.46	3,631.19	..	..	1,990.43	2,415.19	11,356.27
9	*State council of Academic Awards (pp.55-57).	..	..	100.00	100.00	..	..	1,500.00	1,825.00	3,525.00
10	*Post-graduate Universities of Madras, Anna- malai and Madurai (p. 57)	..	..	630.00	145.00	..	..	442.00	92.00	1,309.00
11	Madras University of Technology, Tamil Nadu (pp. 58-59).	..	5.00	511.00	400.00	..	5.00	547.50	580.00	2,048.50
12	Tamil Nadu Agricultural University (p. 59) ..	10.00	10.00	200.00	200.00	30.00	30.00	250.00	300.00	1,030.00
13	Library and Documentation Development (pp. 59-61).	..	3.00	26.07	21.15	..	5.00	37.24	42.02	134.48
14	International Institute of Tamil Studies (p. 61).	..	25.00	10.00	10.00	..	10.00	55.00	60.00	170.00
15	*Tamil Nadu Science Foundation (p. 63) ..	..	5.00	..	..	..	2.00	500.00	655.00	1,162.00
16	Tamil Nadu Academy of Basic and Applied Sciences (pp. 63-64).	..	5.00	..	..	..	2.00	10.50	10.50	28.00

17	Hall of Science and Industry in Tamil Nadu (pp. 64-65).	..	..	40.00	46.95	..	..	20.00	36.50	143.45
18	Computer Centres (pp. 65-66)	..	..	4.00	60.00	60.00	..	0.50	16.25	174.50
19	†A Centre of Ocean Engineering and Marine Science (pp. 63-64).	..	..	5.00	9.00	9.00	..	2.00	25.00	70.00
20	†Institute of Management (p. 67)	..	..	5.00	30.00	22.50	..	3.00	75.00	280.50
21	†Materials Testing Bureau (p. 68)	..	..	5.00	43.00	27.00	..	3.00	50.00	203.00
22	† Centre of Automotive Engineering and Development (pp. 68-69).	..	..	10.00	30.00	8.50	..	3.00	40.00	145.50
23	† Centre for Urban-Engineering (pp. 69-70)	..	..	5.00	5.00	..	..	2.00	10.00	32.00
24	Education Planning Cell Tamil Nadu (pp. 79-80).	..	..	1.00	1.00	1.50	..	2.00	60.00	140.50
25	Administration and Management of Education Culture, Science and Technology (pp. 80-85).	..	..	27.00	5.00	..	..	190.00	210.00	432.00

* To be proposed as Centrally sponsored scheme.

† Indicates that the project proposed by Education Task Force belongs in another area and has to be processed by concerned department.

EDUCATION PROJECTS

(RUPEES IN LAKHS.)

	Year.										Capital. Recurring.	
1972-73	100.0	62.50
1973-74	61.00	141.50
Vth Plan	6,741.22	9,220.68
Vlth Plan	8,670.61	12,659.44
Total (capital+recurring) Rs. 37,566.95 lakhs or Rs. 375.67 crores.												

NON-EDUCATIONAL PROJECTS WITH A BEARING ON EDUCATION.

(RUPEES IN LAKHS.)

	Year.										Capital. Recurring.	
1972-73
1973-74	25.00	13.00
Vth Plan	117.00	200.00
Vlth Plan	67.00	309.00
Total (capital+recurring)=Rs. 731.00 lakhs or Rs. 7.31 crores.												

ANNEXURE I.

Summary of Responses to Proposed Education Model.

The Education Model for Tamil Nadu set forth in Chapter II was circulated to the Vice-Chancellors, students' unions in colleges through their principals, to teachers' organisations, Government departments and legislators in Tamil Nadu inviting their responses and comments.

These have been analysed, coded and tabulated as below :—

<i>Categories contacted.</i>	<i>I. Response Rate.</i>		
	<i>Number of Institutions.</i>	<i>Number of responses</i>	<i>Response rate (percentage 2 to 1)</i>
(1)	(2)	(3)	(4)
(i) Universities	5	4	80
(ii) College Students' Unions	169	42	25
(iii) Teachers' Organisations	4	2	50
(iv) Teacher M.L.Cs. and others	8	4	50
	186	52	28

II. REVIEW OF THE RESPONSES BY CATEGORY OF INSTITUTIONS.

Questionnaire points.	All categories combined.			Vice-Chancellor.			College Student's Union.			Teachers' Organization.			Teacher M.L.Cs. and others.		
	Yes.	No.	Nil.	Yes.	No.	Nil.	Yes.	No.	Nil.	Yes.	No.	Nil.	Yes.	No.	Nil.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(a) Present 1 years' school course to be covered in 10 years with appropriate upgrading curricula, etc.	35 (67%)	16 (31%)	1 (2%)	1	2	1	29 (69%)	13 (31%)	..	2	..	..	3	1	..
(b) Further disaggregation of the present 3-stage school into 5 stages.	17 (32%)	31 (60%)	4 (8%)	..	2	2	15 (36%)	26 (62%)	1 (2%)	..	2	..	2	1	1
(c) Out-of-school education and training to be organised in existing institutions with existing staff for early school-leavers.	40 (77%)	5 (10%)	7 (13%)	1	..	3	34 (81%)	5 (12%)	3 (7%)	1	..	1	4	..	..
(d) Class IX and X to be designed as terminating classes.	37 (71%)	4 (8%)	11 (21%)	1	..	3	33 (79%)	4 (9%)	5 (12%)	..	..	2	3	..	..
(e) Entire school curricula to be functional in relation to rural and urban environments.	40 (77%)	9 (17%)	3 (6%)	2	..	2	33 (79%)	9 (21%)	..	1	..	1	4	..	..
(f) All examinations are to be of internal assessment except for Class X where a combination of internal and external evaluation could be used.	45 (86%)	3 (6%)	4 (8%)	3	..	1	37 (88%)	3 (7%)	2 (5%)	1	..	1	4	..	..
(g) (i) Out-of-school education and training to be provided for students who leave school, adults, illiterates and literates.	44 (84%)	3 (6%)	5 (10%)	2	..	2	37 (88%)	3 (7%)	2 (5%)	1	..	1	4	..	..
(ii) This programme should be both in general education and vocational and professional training leading to educational diplomas.	45 (86%)	2 (4%)	5 (10%)	2	..	2	38 (90%)	2 (5%)	2 (5%)	1	..	1	4	..	..
(h) Further disaggregation of higher education necessary : 2 years' intermediate + 2 years' degree + 2 years' post-graduate.	47 (90%)	2 (4%)	3 (6%)	2	..	2	40 (96%)	1 (2%)	1 (2%)	1	1	..	4	..	..
(i) The semester system and its evaluation procedures to be followed in all institutions of higher education.	42 (80%)	5 (10%)	5 (10%)	3	..	1	35 (83%)	5 (12%)	2 (5%)	..	..	2	4	..	..
(j) Research in all sciences (physical, natural, applied and human) to be promoted, stimulated and co-ordinated.	40 (77%)	1 (2%)	11 (21%)	3	..	1	32 (77%)	1 (2%)	9 (21%)	1	..	1	4	..	..
(k) More equitable sharing between public and private sources of total finances of education necessary.	40 (77%)	2 (4%)	10 (19%)	2	..	2	35 (83%)	2 (5%)	5 (12%)	..	..	2	3	..	..

ANNEXURE II.

Internal Evaluation and the Semester System.

1. *Introduction.*—The success of any educational programme depends upon the following factors :—

- Well-defined objectives;
- Adequately prepared students;
- Well-designed course-content to realise the major objectives of the programme;
- Effective teaching-learning process;
- A valid and reliable evaluation system; and
- Placement of students.

2. The need for updating the curricula and syllabi are obvious. The six factors cited above require continuing appraisal and should be followed by reform where needed. The effectiveness of the reform can, however, be judged only by the students' attainment itself—a quantity which is tangible and measurable. In the educational process, written examinations and performance tests are at present the only measuring aids to assess the student's attainment. The effective implementation of a programme as a whole, (or) the extent of the impact of a certain reform on a programme, is dependent on how far these measuring aids (examinations) are accurate, valid and reliable. It is evident that defective measuring aids will lead to erroneous conclusions and misleading inferences. The success of an educational programme thus depends substantially on an effective evaluation system.

Examination Reform and Semester System.

3.1. Educational institutions in Europe, the U.S.A. and many other countries work under the semester, trimester or quarter systems, which work well in these countries. The word semester means a period of six months; any educational programme involving sessions of six months' duration may be said to be operating on the Semester System. However, duration is not its only feature. It connotes a certain distinctive educational pattern and is very closely bound up with the following salient features :

- (i) Course duration of about 15 weeks;
- (ii) Continuous evaluation of student's attainment by the respective instructor, which may be termed internal evaluation and the grading of students at the end of each semester; and
- (iii) Considerable flexibility in the choice of subjects.

3.2 This system has evidently been evolved after taking into consideration the financial and administrative constraints, physical facilities, and the socio-economic set-up of the countries where they are now in use.

Advantages of the System.

4.1 The system provides for the progressive evaluation of the student's attainment throughout the semester. The grading of students based on a number of assessments will be more dependable and valid and will project a more precise picture of the pupils' proficiency than the measure of a single performance. It also offers scope for employing different methods of evaluation depending on the nature of the attainment required to be measured.

4.2 It sets up a motivation in the student towards the proffered goals inculcates in him a habit of regular study keeps him busy throughout the year and encourages self-study. It also provides for self-evaluation by the teacher and brings about an improvement in teaching.

4.3 The student accepts the examination as another learning activity and is able to perform better. Thus the teaching-learning process will gain maximum efficiency and the objective of the programme is accomplished.

Need for reform in the existing examination system.

5.1 The evaluation system as has been followed by the Universities in our country may be aptly named as the external examination system.

5.2 Examinations are held at the end of an academic year and the performance in that examination alone decides whether or not a student has acquired proficiency in a subject. Consequently there is no compulsion on the students to study regularly over the entire academic year. Serious reading and working are postponed to the last few months of the academic year when the student resorts to selective cramming after surveying a few question papers from previous examinations.

5.3. Many of the deficiencies in our education can be traced to the present examination system. The main objective of the system becomes in the sequel not acquisition of knowledge but the passing of an examination. The development of such faculties as application analysis and any thesis are not even seriously thought of.

5.4 We have succeeded in developing an educational pattern in which 30 lakhs of the nation's precious citizenry spend a major part of the academic year without doing any serious work and converge to some sort of a concentrated effort during the last two months with such an elementary objective as somehow securing a passing grade in the final examination. Without a change in the method of evaluation any reform in education particularly at the higher levels of learning is not likely to make any significant difference to the outcome.

Certain considerations.

6.1 The single most important reform will be the introduction of continuous internal evaluation. Along with that it is also desirable to switch over to the semester pattern. The following problems may arise with the introduction of such a reform :—

(i) The system works well in institutions which are autonomous. When it concerns more than one institution as in the case of affiliated colleges of a University there is a need not only for standardization of the evaluation process but also an agency to oversee. In such a situation the implementation of the system presents a new problem.

(ii) There is an inherent inclination on the part of the educational community to think that if the evaluation in a particular subject is left in the hands of an instructor uniformity among colleges cannot be obtained.

(iii) The doubt has been expressed that there may be favouritism or victimisation based on considerations of community, language, religion, etc., as well as due to personal prejudices.

(iv) The fear has also been felt and expressed that the staff members may be tempted to use this internal evaluation as a level against the students to impose an unusually rigid discipline.

(v) Failed candidates and drop outs may pose problems.

(vi) The syllabus requires complete recasting for purposes of internal evaluation.

(vii) If the semester system is to become fully effective all the semesters for a course must by and large run parallel. This will require considerable additional physical facilities and staff. The introduction of internal evaluation by itself may call for additional staff at the senior level.

6.2. All these difficulties may be legitimate or unavoidable; but they should not be allowed altogether to preclude internal evaluation. Students must not be allowed to waste most of their time during their University life which they tend to do in the absence of such a system. The challenge to educators and educationists lies in bringing about this reform in a form that will be satisfactory and acceptable in the existing circumstances.

Working of the System in Engineering Education.

7.1. During the last six years, efforts have been made to introduce progressive evaluation and the semester pattern in the Engineering Colleges affiliated to the Universities of Madras and Madurai. The introduction has been effected in stages and a combination of internal evaluation and external examination systems has been employed. Attempts have been made to build provisions into the regulations so that marks obtained in internal evaluation effectively influence the final result. At the same time, a minimum in the external examination is also prescribed for a part to avoid any apprehension of undue favour being shown by any institution to its students. These procedures are being gradually worked out since it takes time for the teachers to take over a new system and work it and for the public to develop full confidence in its intrinsic fairness and that of the individuals involved.

7.2. It may be difficult to suggest common regulations for all the Courses. Each course must be studied in detail and a suitable method of internal assessment introduced. It is inevitable, that, in the initial stages at any rate, both external examination and internal evaluation must co-exist, and their relative importance has to be decided. The long-term objective should be the complete elimination of external examination and the introduction of an accreditation system to ensure the maintenance of standards.

7.3. An important step in this direction will be the introduction of a system of autonomous colleges. It is an important recommendation of the Kothari Commission, and offers vast scope for effective examination reform as well as systematic experimentation at least in a few chosen institutions. Uniformity in standards among affiliated colleges is an important requisite of internal evaluation. The principals of engineering colleges have arrived at the following guidelines in an effort to ensure some measure of uniformity.

7.4. *Methods of Assessment.*—A combination of the following methods of assessment will be used, depending upon which of them are suitable for individual subjects.

A. (i) Periodical tests; (ii) Assignments; and (iii) Tutorial problems.

B. (i) Oral test; (ii) Project work; and (iii) Laboratory records.

C. (i) Participation in seminars; (ii) Regularity, punctuality and presentation; and (iii) General proficiency.

7.5. *Allocation of Marks.*—In internal evaluation, marks should be used to adjudge performance uniformly according to the following academic and other criteria:—

- | | | |
|--|--------|--------------|
| (i) Attendance, regularity, punctuality | ... .. | 10 per cent. |
| (ii) General proficiency, aptitude, presentation, participation in seminars and discussions. | | 10 per cent. |
| (iii) Periodical tests | ... .. | 50 per cent. |
| (iv) Assignments, tutorials, laboratory records, reports and projects. | | 30 per cent. |

7.6. Attendance above the minimum prescribed by the University, punctuality in attending classes, regularity and promptness in the fulfilment of various academic tasks will form the basis for the award of 10 per cent of the marks.

7.7. Participation in seminars, discussions, general proficiency, aptitude oral and written presentation and the overall assessment of the candidate by the instructor on the basis of the latter's contact with the student in and outside the class will form the basis for the award of another 10 per cent of the marks.

7.8. There must be at least three periodical tests in a semester. The number can be more. If there are no tests, the best (n-1) test may be taken into consideration, two tests out of three being the minimum. The allocation of 50 per cent of the marks for periodical tests will be common for subjects in which instruction consists predominantly of lectures, design, drawing or laboratory/workshop classes. The nature of the tests must be such that they can be conducted within the duration fixed for regular class lecture/laboratory/design and drawing. The staff member concerned must keep a record of the tests given and marks obtained for scrutiny by a competent authority.

7.9. The balance of 30 per cent of the marks are reserved for tutorials, assignments, design and drawing, reports, projects, laboratory work as well as oral examinations. The methods used will depend upon the subject. Assignments involving mere problem-solving will mainly be done in the class under staff supervision. Even in the case of design and drawing, report writing, etc., only those categories of work which do not lend themselves to simple copying should be permitted to be done at home. Within practicable limits, care must be exercised to see that copying is not practised even through consultation and the guidance either from the staff or from colleagues need not be ruled out.

7.10. The minimum number of assignments for a semester should be three in the case of undergraduate classes and six in the case of post-graduate classes. Each assignment can have sub-divisions. The number of assignments should preferably exceed the minimum prescribed. The assignment can take the form of a set of problems, designs and drawings, the preparation of laboratory and other reports.

7.11. *General Guidelines.*—The faculty members must be informed about the need of keeping the evaluation objectives taking care to see that the students are convinced that the evaluation is objective and systematic. In general the following points may be stressed:—

(i) records of tests, assignments and any other form of evaluation must be kept and should be made available for scrutiny by a competent authority;

(ii) the marks obtained in tests and assignments must be made known to the students at the end of each month in tabulated form. This is in addition to the marking given at the time of returning test-papers or assignments sheets; and

(iii) the number of assignments and tests prescribed in the foregoing are the minimum; effort must be made to base the final grading on as many valid methods of evaluation as possible.

7.12 Similar guidelines suited to the requirements of arts colleges may be worked out and implemented.

Working of the System in Indian Institute of Technology.

8.1. *The Semester Pattern of Course Organization.*—The Indian Institute of technology in Madras has from the outset nurtured the internal assessment system for the evaluation of the performance of its students. Its post-graduate courses (M.Sc./M.Tech.) were from the beginning operated on the semester pattern. The first degree course in the Institute (B.Tech.) was run on an yearly basis during the first few years, and the switchover to the semester pattern came about in 1969. All the instructional courses are now on the semester pattern.

8.2. Each academic year is made up of two semesters with 15 weeks of instruction. There are three weeks set apart at the end of each semester for the scheduling of the semester examinations (theory and practice). There is a winter recess of five weeks between the first and second semesters, and a summer vacation of 11 weeks following the second semester.

8.3 The prescribed theory courses are conceived of as units of cogent material that can be presented over a 15-week period, typically at the rate of three hours per week. The laboratory courses also last 15 weeks and are usually held at the rate of three hours per week or six hours per week, depending on the discipline and its requirements. The curriculum includes several practical courses, e.g., drawing and design, workshop, etc., with appropriate weekly loads of work.

8.4. The semester system has here been remarkably successful in its operation. Its potentiality for eliciting concentrated effort both from the staff and the student has been noted.

8.5 The only sufferers are those students who fail to make the grade and cannot proceed from one semester to the next. They lose a year and there is an interregnum of idle time lasting six months. The institute tries to turn this to good account by requiring those students to undergo training in an industrial establishment. The edge is sought to be taken off the demoralising effect that failure imposes. During the intervening period, the student has had the opportunity to go through a new experience instead of wasting his time at home or merely repeating his studies.

8.6 *The Internal Evaluation System.*—The Evaluation System at the Institute operates as follows. In each prescribed course, three class tests are held on dates which are spaced out evenly and announced at the commencement of the semester. If a student studies five subjects he is scheduled to take a total of 15 tests during the semester. Leaving a couple of weeks free at commencement, each of the remaining weeks contain two tests or at least one. Of the three tests in a subject the best two performances are taken into account for credit. This is to provide for possible absence, failure or poor performance by a student in one out of three trials and to avoid penalizing him for it. The tests are administered by the subject instructor and are meant to test if the student is keeping proper track of the course as it progresses. It will moreover serve as a feedback for the teacher who will then know if he is taking the class with him.

8.7. A given subject may carry tutorial exercises at the rate of one assignment per week. Every week's work counts toward the sessional assessment.

8.8. Where laboratory work is prescribed as a part of the course, the actual work done in the laboratory, together with the reports of practicals and the oral examinations in the laboratory, contribute to the credits given for laboratory work.

8.9. The periodical tests, tutorial exercises and laboratory work are all taken together in a prescribed mix or proportion (such as 2:1:2) to determine the overall credit assigned for class-work. This accounts for 50 per cent of the maximum credit that a student can earn in course-time. The remaining 50 per cent comes from the semester examination on the subject. The latter may take the form of a theory paper; it often includes a laboratory examination as well.

8.10. The sessional performance is adjudged solely by the instructor. In the semester examination, the instructor shares his work both in question-paper-setting and valuation of the answer-script/laboratory examination with an external examiner. The latter may be a faculty member from the same institute, from the same department or a cognate department or from outside the institute. He is expected to serve as a referee and adjudge whether the instructor has done his job fairly.

8.11. In practical subjects like drawing, and design or workshop, the student earns 50 per cent of the credit for his sessional work done over the semester, as judged by one instructor or a group of instructors, and 50 per cent of his performance in a practical examination/viva voce held at the end of each semester.

8.12. In the post-graduate courses (M.Sc./M.Tech.), the instructor has the advantage of greater flexibility with class-work assignment. He may conduct one or more tests; he may prescribe home assignment; or he may pose a design problem. All this can make up 50 per cent of the credit. The semester examination, in which the instructor shares the work in question-paper-setting and valuation of the answer-books with an external examiner, accounts for the remaining 50 per cent.

9.1. In an overall assessment, both aspects, viz., the semester pattern and the internal evaluation, have been pre-eminently successful at the Indian Institute of Technology. The success achieved is attributable to the following considerations:—

(a) The institute is wholly residential. All the students, without exception, live in the hostels. Most of the Faculty live on the campus. Amongst the students, there is a great measure of uniformity in living conditions and pattern of work. There are ample opportunities for student interaction with the Faculty outside of the class room.

(b) All the students in a given discipline are handled and evaluated by a group of teachers belonging to a single institution.

(c) The autonomy of the institute and the character of its Senate, which is in a position to take quick, and positive action on any academic issue that is placed before it create confidence and are a guarantee of fast remedial measures.

9.2. *Complexities in Affiliated Colleges.*—A one-to-one ratio of credit for class-work examination is the very essence of a meaningful internal evaluation system. A single institution which is the arbiter of its own destiny can adopt it with natural ease and make a success of it.

9.3. The assessment of students' performance, when they belong to a number of institutions/colleges that are physically separated from one another though affiliated to a single University, is beset with greater complexities and difficulties in actual implementation. Several safeguards and special steps to introduce uniformity in standards of work-allocation and the apportioning of credit will be essential. The acceptance by the Faculty of the intrinsic merit of the system and the willingness, following this, to maintain standards in an impartial and objective manner, constitute the foundation of the system. The student community will always adapt itself to a system that allows credit to be accumulated over the whole duration of the study period on the basis of steady, sustained work at an even pace for it quiets the fear and the associated perils and uncertainties of a single annual examination as the sole determining factor.

9.4. The difficulties in implementing the system in the case of an University affiliating a number of institutions or in extending it to arts colleges or courses (both post-graduate and under-graduate) may be considerable, but can be overcome in a phased manner through determined effort. The task must be seen as a challenge, but there is no doubt that if it is faced up to, our educational process will gain new momentum and a sense of purpose.

10. 1. *Recommendations.*—In the light of the above, the following recommendations are made :—

(i) The present method of evaluation, based on a single external examination of the end of one year, or in some cases at the end of two years, is unsatisfactory. An examination reform has been long over due and must receive high priority. Any effective reform or change for the betterment of education is conditional upon the evaluation system.

(ii) It is necessary to introduce progressive internal evaluation to ensure that the emphasis is placed on the acquisition of knowledge and the students are obliged to study regularly over the entire year.

(iii) A semester system consisting of two regular semesters and a summer semester in a year may be introduced, but the internal evaluation need not be a necessary concomitant of the semester pattern. Those two reforms are independent of each other, are both desirable and have hence been recommended for adoption.

(iv) There are problems relating to the maintenance of uniformity of standards as between different institutions. Apprehensions regarding possible malpractices and student reservations can be overcome by taking the following preparatory and precautionary measures :

(a) The reform should be introduced gradually and with necessary caution.

(b) The students, the parents and the members of the faculty should be educated about the advantages and the working of the system through seminars and workshops.

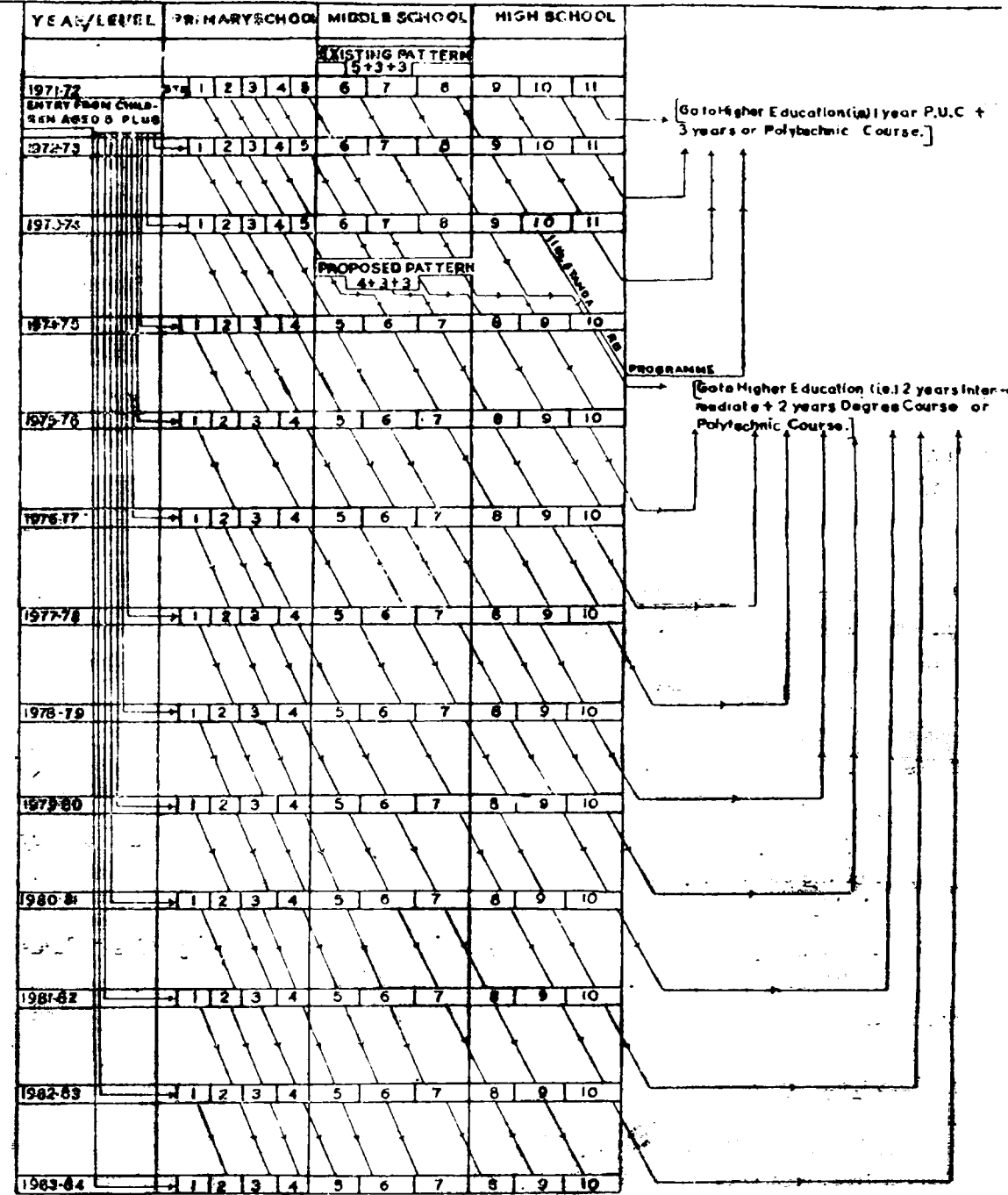
(c) In the initial stages, internal evaluation as well as external examination should co-exist. The relative weightage may have to be decided for each individual course separately. But the main point is that the principle of internal evaluation must be accepted; the details could then be worked out separately. It is recommended that a beginning be made at the post-graduate level and the system later introduced at the under-graduate level.

ANNEX-III

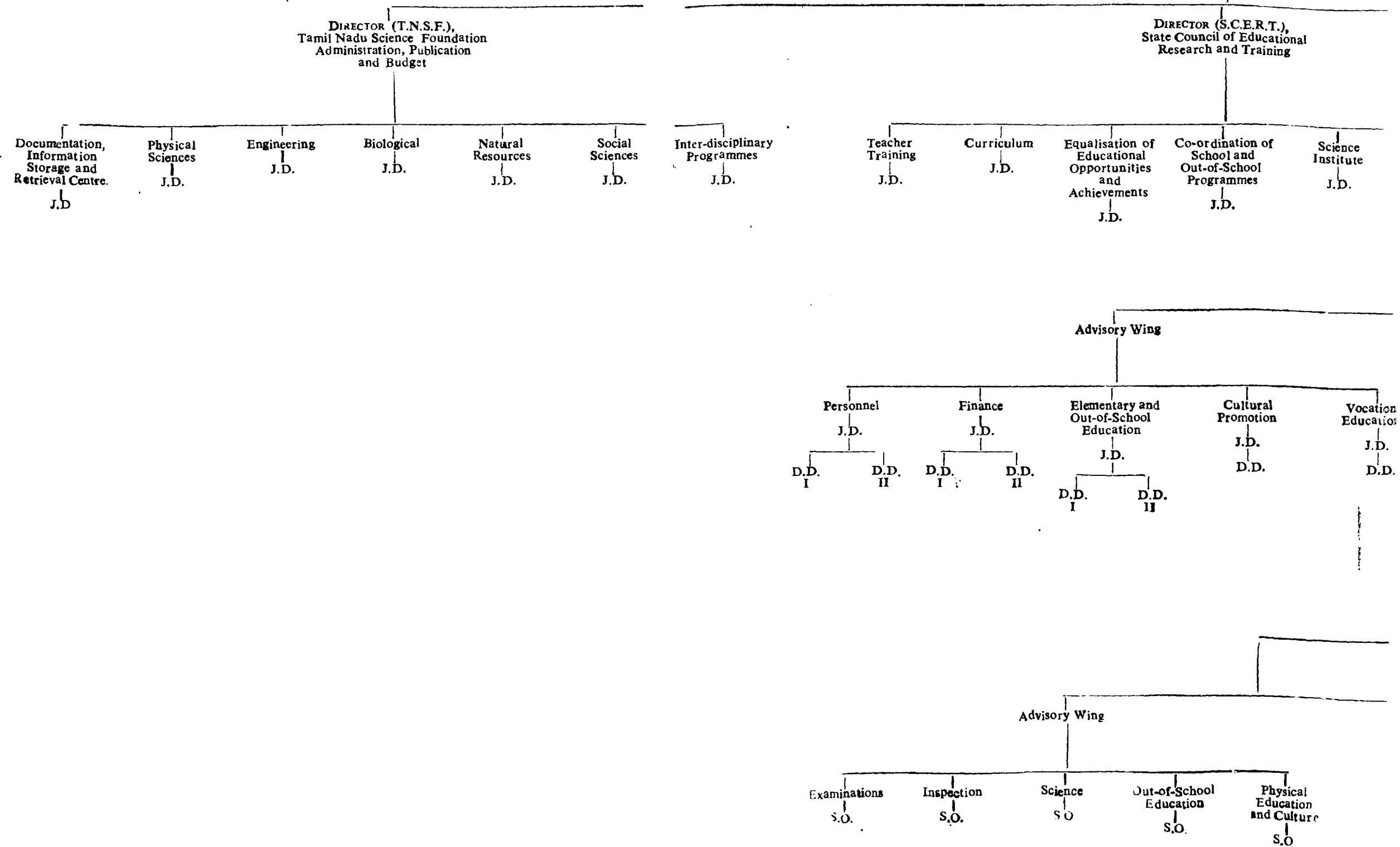
ANNEX TO CHAPTER III (A SIMULATION MODEL FOR EDUCATION IN TAMIL NADU)

SCHEMA

SCHEMATIC FORM OF THE EXISTING AND THE PROPOSED PATTERN OF SCHOOL EDUCATION IN TAMIL NADU



ANNEX IV
 TO CHAPTER VIII.
 A CHART SHOWING THE ADMINISTRATIVE SET-UP IN THE PLANNING AND MAN
DEPARTMENT OF EDUCATION, CULTURE, SCIENCE A
SECRETARY EDUCATION
 HEAD OF PLANNING CELL



MANAGEMENT OF EDUCATION IN TAMIL NADU.
AND TECHNOLOGY.

