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SCHOOL PLANNING FOR INDIA

by

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THE LAND AND THE PEOPLE OF INDIA

India, also known as Bharat, is well marked off from the rest of Asia by mountains and the sea, which give the country an unmistakable geographical unity. Bounded by the Himalayas in the north, the country stretches southward and, at the Tropic of Cancer, tapers off into the Indian Ocean between the Bay of Bengal on the east and the Arabian Sea on the west. Lying entirely in the northern hemisphere, the mainland extends between latitudes 8 degrees 4 minutes 28 seconds and 37 degrees 17 minutes 53 seconds north and longitudes 68 degrees 7 minutes 35 seconds and 97 degrees 24 minutes 47 seconds east, measures about 2,000 miles from north to south and about 1850 miles from east to west, and covers an area of 1,261,597 square miles. Measured by the extent of its territory, India is the seventh largest country in the world. It has a land frontier 9,425 miles long and a coastline of 3,535 miles. (See Plate I.)

The Physical Background

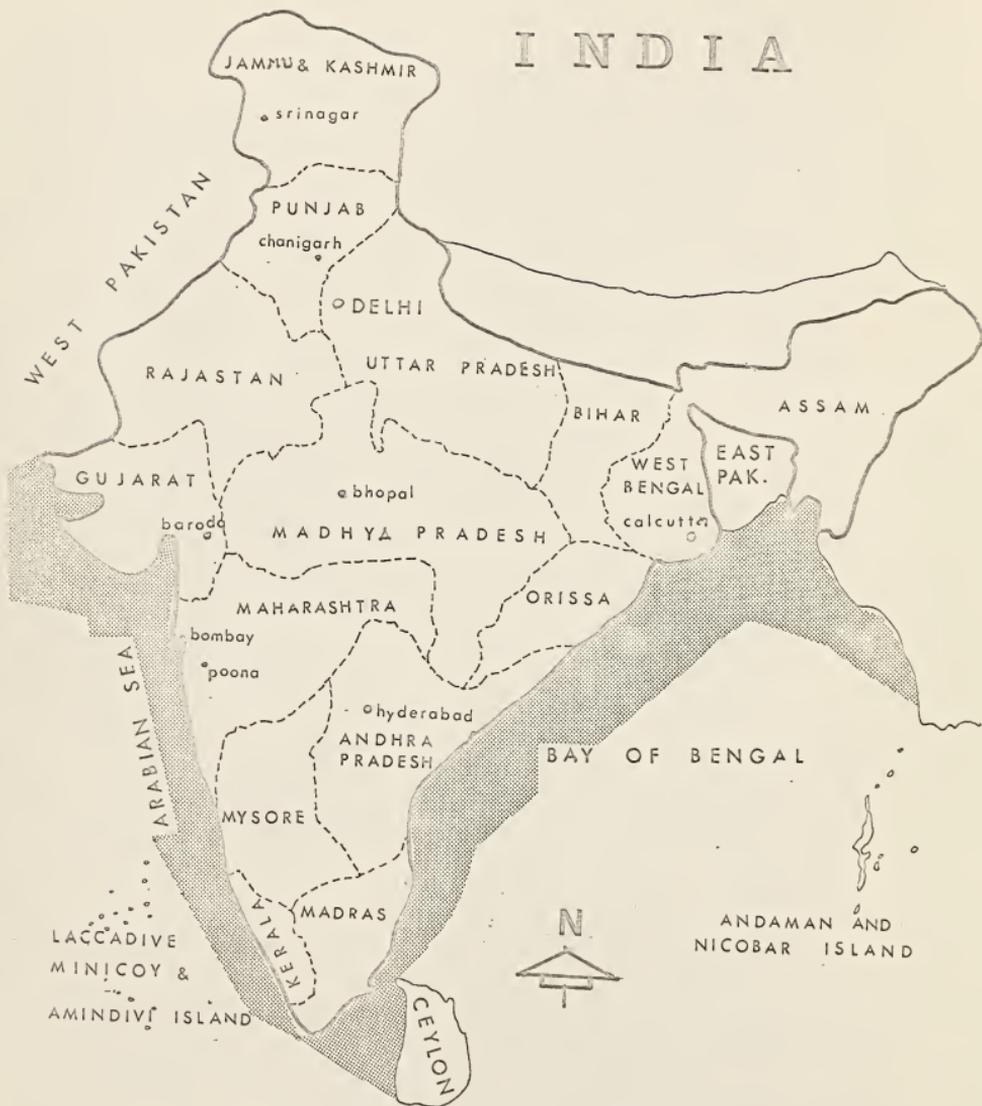
The Himalayas generally form India's northern boundary, beyond which lies China. Nepal, Sikkim, and Bhutan, which also border India in the north and northeast, cover a portion of the Himalayan region. A series of mountain ranges in the east separate India from Burma. In the east lies East Pakistan surrounded by the states of West Bengal and Assam and the Union Territory of Tripura. In the northwest, West Pakistan and

EXPLANATION OF PLATE I

Map of India

PLATE I

INDIA



Afghanistan border on India. In the south, the Gulf of Kambay and the Palk separate India from Ceylon. The Andaman and Nicobar Island in the Bay of Bengal and the Laccadive, Minicoy and Amindivi Island in the Arabian Sea are parts of the territory of India.

Physical Features

The mainland comprises three well-defined regions. Below is a comparison of the three well-defined regions of the mainland.

1. The great mountain zone of the Himalayas.
2. The Indi-Gangetic Plain.
3. The southern Peninsula.

The Himalayas comprise three almost parallel ranges interspersed with large plateaus and valleys, some of which, like the Kashmir and Kulu Valleys, are fertile, extensive and of great scenic beauty. Some of the highest peaks in the world are to be found in these ranges. The high altitudes limit travel only to a few passes, notably the Jelep La and Natu La on the main Indo-Tibet trade through the Chumbi Valley, northeast of Darjeeling. The mountain wall extends over a distance of about 1500 miles with a varying depth of 150 to 200 miles. In the east between India and Burma and India and Pakistan, the hill ranges are much lower. The Garo, Khasi, Jaintia and Haka hills running almost east-west join the chain of the Lushai and Arakan hills running north-south.

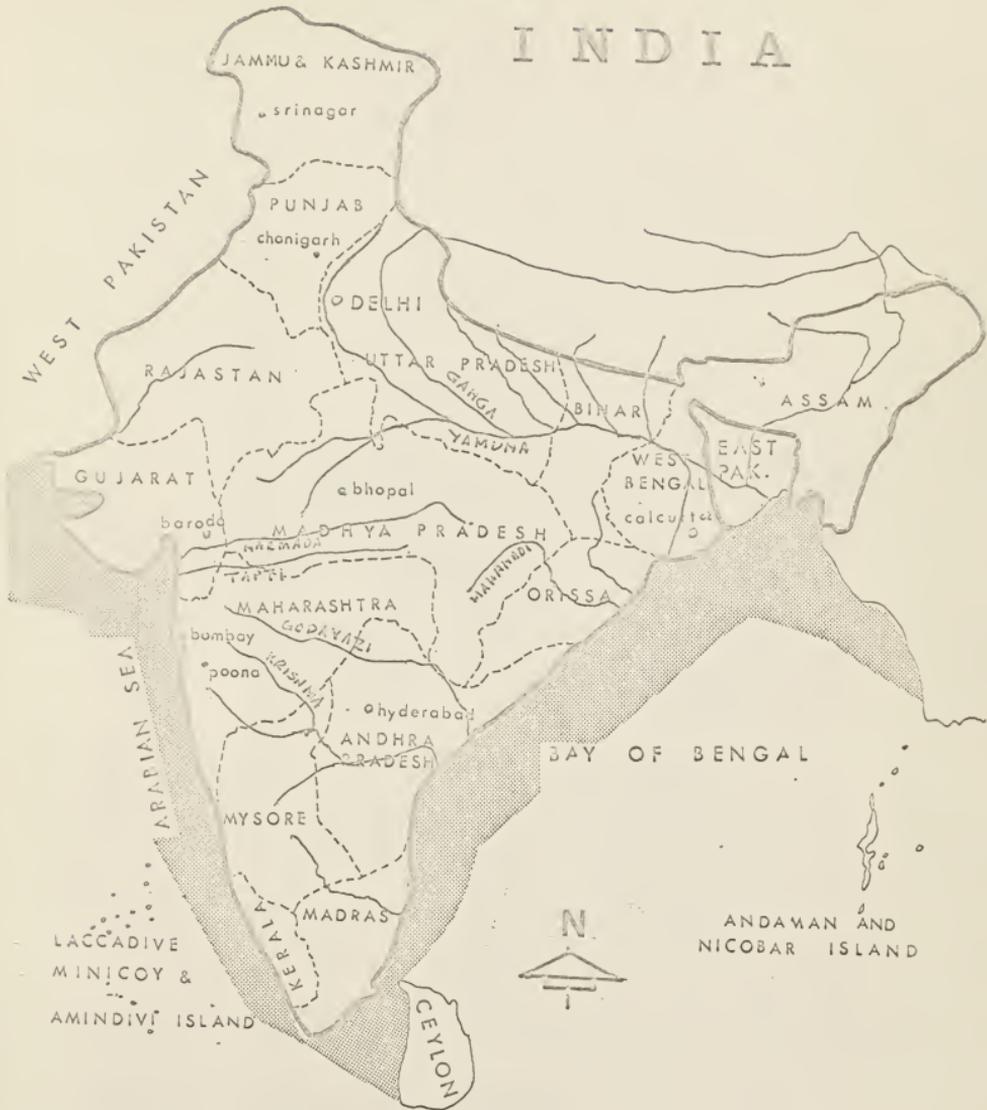
The Indo-Gangetic Plain, 1500 miles long and 150 to 200 miles broad, is formed by the basins of three distinct river systems, the Indus, the Ganga, and Brahmaputra. It is one of the world's greatest stretches of flat alluvium and also one of the most densely populated areas on earth. There is hardly any variation in relief. Between the Yamuna river at Delhi and the Bay of Bengal, nearly 1000 miles away, there is a drop of only 700 feet in elevation.

The Peninsular plateau is marked off from the Indo-Gangetic Plain by a mass of mountain and hill ranges varying from 1500 to 4000 feet in height. The more prominent among these are the Aravalli, Vindhya, Satpuda, Maikal, and Ajanta. The Peninsula is flanked on one side by the Eastern Ghats, where the average elevation is about 2000 feet, rising in places to over 8000 feet. Between the Western Ghats and the Arabian Sea lies a narrow coastal strip, while between the Eastern Ghats and the Bay of Bengal there is a broader coastal area. The southern point of the plateau is formed by the Nilgiri hills where the Eastern and Western Ghats meet.

River Systems

The rivers in India may be classified as follows: (1) Himalayan rivers, (2) the Deccan rivers, (3) the coastal rivers, and (4) the rivers of the inland drainage basin. (See Plate II.) The Himalayan rivers are generally snow-fed, and therefore have continuous flow throughout the year. During the monsoon months

INDIA



the Himalayas receive very heavy precipitation everywhere and the rivers discharge the maximum amount of water during this season, causing frequent floods. The Deccan rivers are generally rain-fed, and therefore fluctuate very much in volume. A very large number of streams are nonperennial. The coastal streams, especially of the West Coast, are short in length and have limited catchment areas. The Luni is the only river that drains into the Rann of Kutch.

The Ganga basin is the largest, receiving waters from an area which comprises about one-quarter of the total area of India. Its boundaries are well-defined by the Himalayas in the north and the Vindhya mountains in the south. The Ganga has two main headwaters in the Himalayas--the Bhagirathi and the Alakananda, the former rising from the Gangotri glacier at Gaumulch. The Ganga is joined by a number of Himalayan rivers including the Yamuna, Ghaghara, Gandak, and the Kosi. The westernmost river of the Ganga system is the Yamuna, which rises in the Kamnotri glacier and joins the Ganga at Allahabad. Of the rivers flowing north from central India into the Yamuna or the Ganga, mention may be made of the Chambat, the Betwa, and the Sone.

The second largest river basin in India is that of Godawari. It covers an area which comprises about ten per cent of the total area of India. The basin of the Brahmaputra in the east and that of the Indus in the west are about the same size. The Krishna basin is the second largest in the Peninsula. The basin of the Nermade in the uplands of the Decan and that of the

Kaveri in the far south are of about the same size, though of different character and shape.

The two other river systems which are small but nevertheless agriculturally very important, are those of the Tapti in the north and the Pennar in the south.

Climate

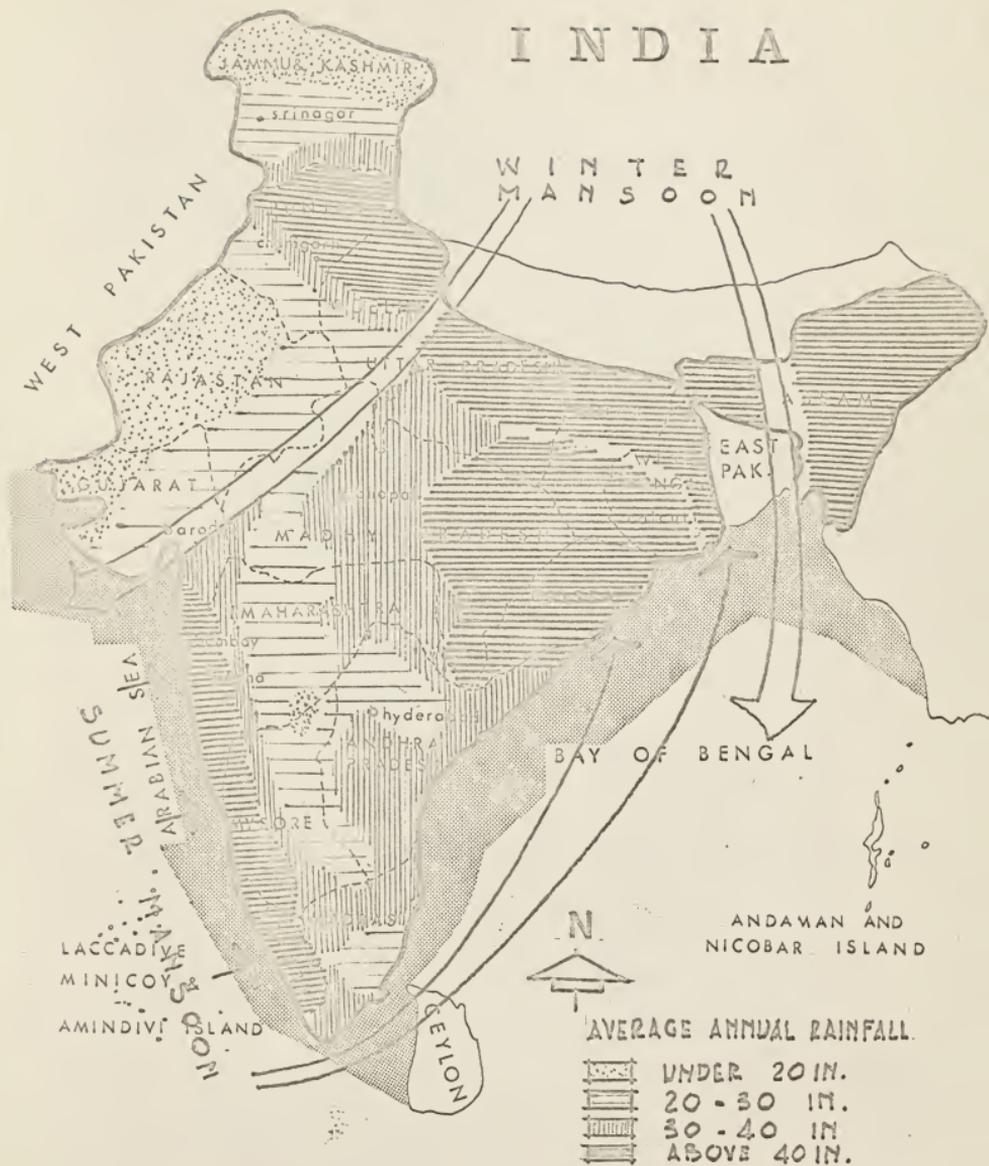
The India Meteorological Department recognizes four seasons: (1) The cold weather season (December-March), (2) the hot weather season (April-May), (3) the rainy season (June-September), and (4) the season of the retreating southwest monsoon (October-November). (See Plate III.)

There are four broad climatic regions based on rainfall. Practically the whole of Asam and the west coast of India lying at the foot of the Western Ghata and extending from the north of Bombay to Trivandrum are areas of very heavy rainfall. In contrast to these, the Rajasthan desert extending to Kutch, and the high Ladakh plateau of Kashmir extending westward to Gilgit are regions of low precipitation. In between these areas at the extreme ends of the rainfall range are two areas of moderately high and low rainfall, respectively. The former consists of a broad belt in the eastern part of the Peninsula merging northward with the north India plains and southward with the eastern coastal plains. The latter comprises a belt extending from the Punjab plains across the Vindhya mountains into the western part of the Deccan, widening considerably in the Mysore plateau.

EXPLANATION OF PLATE III

Map of India--average annual rainfall.

INDIA



AVERAGE ANNUAL RAINFALL.

-  UNDER 20 IN.
-  20-30 IN.
-  30-40 IN.
-  ABOVE 40 IN.

The People

India's population is made up of many racial strains. Within her vast boundary, several races speaking a number of languages and professing all the religions of the world reside. (See Tables 1 and 2, and Plate IV.) India is the world's second most populous country. Her total population, according to the 1961 census, is estimated at 438 million, with an average density of 384 per square mile. Over 358 million of the people live in the country's 560,000 villages and nearly 80 million live in towns. The number of females per one thousand males is 940.

India is a secular state. She presents a rich fusion of religions and cultures.

The Aryans, who came to India more than four thousand years ago, established Hinduism, and today about 80 per cent of the people of India are Hindus.

Among other religions which originated in India are Buddhism, Jainism, and Sikhism. Islam came to India in the eighth century with the advent of the Arabs, and made rapid headway during the subsequent rule of the Pathans and the Moghuls. India's 52 million Muslims represent the third biggest Muslim population of the world.

The first Christians came to India in the first century A.D., but it was not until the establishment of direct sea route from Europe in the seventeenth century that Christianity made any appreciable impact on India. There are about 13 million Christians in India today.

States and Union Territories of India

The Union of India comprises fifteen states and seven centrally administered territories. Details of the new Indian states and territories are shown in Tables 1 and 2.

Table 1. Area and population.

State or territory	: Area in : square miles	: Population : (1961)
States:		
Andhra Pradesh	106,052	35,977,999
Assam	84,899	11,860,059
Bihar	67,198	46,457,042
Gujarat	72,138	20,621,283
Jammu and Kashmir	86,024	3,583,585
Kerala	15,003	16,875,199
Madhya Pradesh	171,210	32,394,375
Madras	50,132	33,650,917
Maharashtra	118,530	39,504,294
Mysore	74,122	23,547,081
Orissa	60,162	17,565,645
Punjab	47,084	20,298,151
Rajasthan	132,150	20,146,173
Uttar Pradesh	113,452	73,752,914
West Bengal	33,928	34,967,634
Union Territories:		
Andaman and Nicobar Islands	3,215	63,438
Delhi	573	2,644,058
Himachal Pradesh	10,880	1,348,982
Laccadive, Minicoy, and Aminidive Island	11	24,108
Manipur	8,628	778,318
Tripura	4,036	1,141,492
Dadra, Nagar Haveli	188	50,873

Table 2. Classification of Indian population
by mother tongue, 1951.¹

Languages	Total number of persons speaking	Percentage to the total
1. Hindi	149,944,311	46.3
2. Urdu		
3. Hindustani		
4. Punjabi		
5. Telugu		
6. Marathi	27,049,522	8.3
7. Tamili	26,546,764	8.2
8. Bengali	25,121,674	7.8
9. Gujarati	16,310,771	5.1
10. Kannada	14,471,764	4.5
11. Malayalam	13,380,109	4.1
12. Oriya	13,153,909	4.0
13. Assamese	4,988,226	1.5
14. Kashmiri	51,086	
15. Sanskrit	555	
Total	323,978,607	100.0

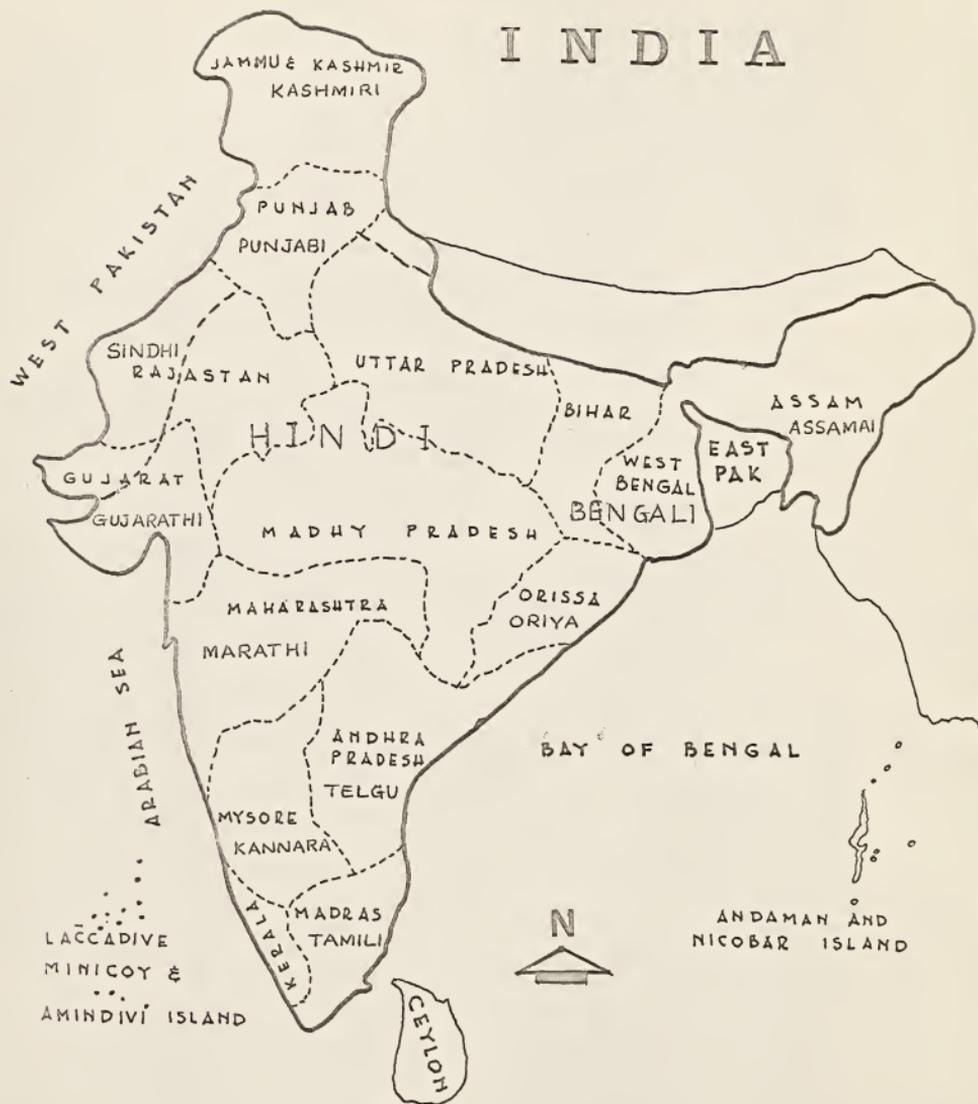
¹India, 1959, p. 45.

EXPLANATION OF PLATE IV

Simplified linguistic map of india.

PLATE IV

INDIA



EDUCATION IN ANCIENT INDIA--VEDIC PERIOD

India's civilization is very old indeed, and along the course of the Indus remains of cities have been found probably dating from 2000 years before Christ. But the first recorded fact is the invasion of the country some 1200 years B.C., by successive waves of a fair people speaking a tongue which is derived from the same source as Latin and Greek. These are generally known as the Aryans, and they originally settled in Afghanistan and northern parts of the Punjab. Later they were pressed forward by following waves of invaders, moving eastward into the Gangetic Valley, where they overcame the natives. Here they settled down and intermarried with the native people. But the higher classes who were proud of their fair complexion, kept themselves apart, and this gave rise to the peculiar institution known as caste, which seems to have been originally a kind of color bar.

Classical tradition calls for four individual divisions, each fulfilling different functions. These are called the caste or classes. They were the Brahmins, who engaged in religious and intellectual occupations, the Kshatriyas, or warriors, the Vaisyas, or businessmen and landowners, and the Sudras (Untouchable), whose duty it was to serve the others as artisans, workmen, and peasants.

A caste is now a family group practicing a hereditary occupation. No member of one caste may intermarry with a member of another. The highest caste of all is that of the Brahmins,

who claim pure Aryan descent. They are the learned class and are the priests and interpreters of the Hindu Scriptures. At the other end of the scale are the outcasts, or Shudra.

It is interesting to note that in ancient times religion was the mainspring of one's activities. It was of all absorbing interest and embraced not only prayer and worship but everything--philosophy, morality, law, and government. The study of Vedic literature was indispensable to every Hindu, and he had to be a very careful individual in his moral, spiritual, and intellectual growth. In short, the entire life of an Indian sprang from religion.

Religion saturated educational ideas, too. The educational system aimed at the building up of character, the development of personality, and the preservation of the ancient culture of the motherland. The aim of education was to develop various aspects of life and also to insure social service. As the Upanayana (thread ceremony) was a compulsory sansakara (sacrament) for every Brahmin (Aryan), education was more or less compulsory for every boy of the Traivarnikas (the Brahmins, the Kahatriyas, and the Vaishyas). The stages of instruction were very well defined, viz., up to the age of seven at home, from eight to sixteen at school, and then at a university. During the whole course at school as at college, the student had to observe strict bramacharya, viz., simple dress, plain food, a hard bed, and a celibate life. He had to learn how to pray, to offer sacrifices, and to perform his social and religious duties. There were no exceptions, the rich and the poor being treated alike.

The success of the whole system depended to a great extent on the relation between the teacher and the taught--the reverence of the pupil for his guru (teacher) and the guru's affection for his disciple in return. The social status of the teacher was very high, and even the mightiest monarch used to pay homage to the humblest teacher. The teaching profession was adopted for the love of work and not so much for earning money. Learning was prized for its own sake and as a mark of the highest human development, and teaching was never handicapped by examination requirements.

But by about the end of the seventh century B.C., the Vedic ritual and learning had become more and more complex. Education was mostly confined to the Brahmins, and the Upanayana (thread ceremony) was being gradually discouraged among the non-Brahmins. The teaching profession was virtually controlled by the Brahmins, and education aimed at preparing individuals for their future vocations. Religion was reduced to a complicated ritual to be performed by Brahmin priests in a language hardly intelligible to any but a few. The formalism and exclusiveness of the Brahmanic system were largely responsible for the birth of two new religions, viz., Buddhism and Jainism.

Both these religions did not recognize the authority of the Vedas and challenged the exclusive claims of the Brahmins to the priesthood. Their founders, Buddha and Mahavira, taught through the common languages of the people and gave education to all, irrespective of caste, creed, or sex. Buddhism also introduced the monastic system of education. Monasteries

attached to Buddhist temples served the double purpose of imparting education and of training persons for the priesthood. Some of the monasteries, especially those at Nalanda and Taxila, had acquired an international reputation. In fact, Indian culture was at its zenith during this period. Numerous foreign scholars and pilgrims came to this country to drink deep at the fountain of her culture. But very soon Hinduism absorbed the best elements of Buddhism, which disappeared from India with the advent of the Mohammedans.

Thus at the end of the Vedic period, education was influenced by Buddhism, then after Muslim, but the Muslim rulers did not interfere with the education of the Hindus, and Muslim education was confined mostly to the followers of Islam. Hence after this period education naturally received a setback and was at its lowest ebb. Even then a popular system of education survived a century of decay, and numerous indigenous schools were found existing toward the beginning of the last century. We will discuss more about this indigenous system in the next section.

INDIGENOUS EDUCATION IN ANCIENT INDIA

When the British occupied this country, the government found a more or less widespread system of indigenous education. It was, in fact, a well developed national system consisting of both higher and elementary institutions. These institutions had been in existence from times immemorial and they had been woven

in the texture of the social and cultural life of the people. It should be realized that during pre-British days an Indian village was a self-sufficient unit and most villages had their own schools.

William Adam, a missionary of considerable experience, estimated in 1835 that the Bengal and Bihar had 100,000 schools, i.e., roughly two schools for every three villages, and that there was a school for every 400 persons. Official inquiries made during the first half of the nineteenth century showed that in Madras the ratio of the attendance of boys in schools to the male population was one to 34, and that the corresponding figures for Bengal and Bombay were one to 36 and one to 62, respectively. The percentage of literacy was 6.1 per cent in Bengal, and it may be presumed to be the same for India as a whole.

Tables 3, 4, and 5 summarize the general statistics given by Adam.

Table 3. Schools.

District	Number of schools								Total
	Bengali	Hindi	San- skrit	Per- sian	For- mal Ara- bic	Ara- bic	Eng- lish	Girls	
Murshibad	62	5	24	17	--	2	2	1	113
Birbhum	407	--	56	71	--	2	2	1	544
Burdwan	629+1 (infants)	--	190	93	3	8	3	4	931
South Bihar	--	286	27	279	--	12	1	--	605
Tirhut	--	80	56	234	--	4	--	--	374

Table 4. Number of scholars.

District	: Bengali : and : Hindi	: Sanskrit :	: Persian: :and :Arabic	: :English:	:Girls: :	: :	Total
Murshibad	1,080	153	109	26	28		1,396
Birbhum	6,383	393	490	73	11		7,350
Burdwan	13,190	1,358	971	120	175		15,814
South Bihar	3,090	437	1,486	23	--		5,036
Tirhut	507	214	598	--	--		1,319
Total	24,250	2,554	3,654	242	214		30,915

Table 5. Population and number of schools.

Area	: Population	: Number of schools actually existing
Murshidabad	186,841	113
Birbhum	1,267,067	544
Burdwan	1,187,580	931
South Bihar	1,340,610	605
Tirhut	1,697,700	374

Types of Institutions

The indigenous educational institutions for this period were divided into four main types, as follows.

Indigenous institutions

Schools of learning

Elementary schools

Pathshalas
of the Hindus

Madrasahs of
the Muslims

Persian
schools

Schools teaching
through the modern
Indian languages

Schools of Learning. Although the Hindus and Muslims had separate schools of learning, several important features were common to both types of institutions. For instance, both kinds of institutions received pecuniary assistance from rulers, chieftains, and opulent or religious citizens. Both were staffed by learned teachers, some of whom were authors of repute, but most of whom received very low remuneration. In both, instruction was mostly given gratis and no regular fees, as now understood, were charged. Both were mediaeval in character, used a classical language as the medium of instruction (Sanskrit in one case and Arabic or Persian in the other), and imparted instruction on traditional lines. In both, the teachers were remunerated in one or more of the following ways, viz., grants of land made by rulers, occasional voluntary presents from pupils and members of the public, allowances paid by wealthy citizens, and payment in the form of food, clothes, or other articles. Lastly, both had a few teachers who not only taught gratis but

also provided food and lodging to their pupils.

Generally speaking, the schools had no special buildings of their own. Where these existed, they were built either by the teachers themselves, or at the expense of patrons or friends, or by subscription from the people. In most cases, however, the schools were held in the local temple or mosque and not infrequently in the house of some local magnate or patron or of the teacher himself. The students entered the schools at a fairly early age and studied as long as they desired and often for as long as twelve years or more. It must be noted that the state had nothing to do with the day-to-day work of these schools. They were conducted by learned men individually who did so more for religious than for pecuniary considerations.

The Hindu schools of learning were conducted almost exclusively by Brahmins and a very large majority of the students attending them were Brahmins. There were no women students nor any persons belonging to the large number of communities who were denied the right to study the sacred lore. In the Persian and Arabic schools, on the other hand, though the teachers were generally Muslims, a Hindu teacher of Persian was not a rare phenomenon. Moreover, several Hindus attended Persian schools conducted by Muslims because Persian was then the court language. In some of the Bengal districts, Adam even found that the majority of students in Persian schools were Hindus.

The Indigenous Elementary Schools. The schools of learning of this period correspond to the colleges of modern type. They gave the highest instruction known, which, in those days, meant

mostly religious instruction. Their chief object was to produce Moulavis and Pandits, and people were led to support them mainly by religious motives. Although they were highly venerated by the people, they were really the weaker and less useful part of the educational system on account of their exclusive character, conservative tone, and obsolete ideals and methods of instruction.

The indigenous elementary school, the main agency for the spread of mass education, was a humbler but far more useful institution. The instruction given in it was of a practical type. It catered not to the needs of the priestly class, but to the mundane requirements of the petty zamindar, the bania, and the well-to-do farmer. It had no religious veneration attached to it, and consequently it had no endowments either from the state or from the public. Its teachers were men of ordinary attainments, and very often they knew no more than the little they taught in their schools. Their remuneration was much lower than that of the teachers in the schools of learning, and except in those cases where the teacher was maintained by a rich person, consisted of small collections or occasional presents from parents of children who attended the school. Occasionally some of the teachers in these schools followed some other profession or trade for their maintenance and conducted the school only as a side business. Unlike the schools of learning, it was worthy of note that the pupils in these schools included a small percentage of girls and children of many communities although the children of the upper classes formed the large majority.

Some features of the indigenous elementary schools are of

great interest. For instance, their equipment was extremely simple. They had no school buildings and school was held sometimes in the house of the teacher or the patron of the school, often in a local temple, and not infrequently under a tree. There were no printed books and the slates or pencils used by pupils were such as could be easily made in the locality. The hours of instruction and the days of working were finely adjusted to local requirements. The size of the school was generally small, the number of pupils varying from one or two to ten or fifteen at the most. There were consequently no classes, and no regular period of admission. A pupil joined the school at any time, became a class by himself, followed his own pace of study, and left the school when he had acquired all that he desired to know or the school had to teach. In larger schools, there was in vogue a system under which the senior pupils were appointed to teach junior ones. It was this system that attracted the attention of Dr. Bell, the Presidency Chaplain at Madras, and which he introduced in England as a cheap and efficient method of educating the poor. The system later came to be known as the Monitorial or Madras system in England.

Before the end of this discussion of the indigenous educational system of India, I would like to point out with pride that our indigenous schools of India contributed the idea of the monitorial system to England. Historians talk only of England's contribution to Indian education and they generally ignore the great contribution which was made by India to the spread of education among the poorer classes of England herself. Dr. Bell,

the Presidency Chaplain at Madras, was the first Englishman to realize the value of the Indian system of teaching with the help of monitors--a system that prevailed extensively in the indigenous schools. Dr. Bell realized that the main advantage of the system was to enable the teacher to manage a large number of pupils at a time so that the spread of education could be effected at a very low cost. He therefore advocated the adoption of this system in England in a book entitled "An Experiment in Education Made at the Male Asylum at Madras", suggesting a system by which a school or a family may teach itself under the superintendence of the Master or Parent (1798). This book attracted great attention and eventually the Indian system was almost universally adopted in England. This system variously described as the Madras system, or the Monitorial system, was the chief method by which England achieved expansion of primary education at a very low cost between 1801 and 1845. It is an irony of fate that the indigenous schools of India should thus contribute to the spread of education in England and be of no avail in spreading mass education in India herself.

The curriculum was very narrow and consisted of reading, writing, arithmetic (both written and oral), and accounts. There was no fee in the modern sense, but each parent who sent his child to the school generally made some payment to the teacher, either in cash or in kind. The amount of the payment depended upon the capacity of the parent and even the time and mode of payment was left to his convenience.

The chief merits of the indigenous system of elementary

schools were their adaptability to local environment and the vitality and popularity they had earned by centuries of existence under a variety of economic conditions, or political vicissitudes. Their main defects were the exclusion of girls and Harijan (lower class people--untouchables) pupils. To these may be added (although such a judgment suffers from the defect of imposing modern concepts of education upon an earlier period), the lack of training or sound education among their teachers, their narrow and limited curriculum, and the severe forms of punishment adopted.

The Extent of Mass Education

It appears that schools, particularly centers of domestic instruction, abounded in every part of the country and that some humble means of instruction were available even in very small villages where for years together the British administration found it difficult to establish and maintain even a primary school. The percentage of literacy was between eight and twelve among the male adult population, or between four and six for the population as a whole. Certain of the higher castes were wholly literate insofar as the male adult population was concerned, while the women of all castes (with a very few individual exceptions) and the entire population of several lower castes were wholly illiterate.

Decaying Condition of Indigenous Education. Another feature that emerges from the study of the sources is that at the

beginning of the nineteenth century, the indigenous system of education was fast decaying on account of the prevailing anarchy or the growing impoverishment of the people under British rule.

The modern educational system in India should have been built upon the foundations of the indigenous system, and the efforts of our educational administrators should have been directed to the improvement of these institutions and to their incorporation in the modern system of education. But this was never done. On the other hand, some attempts were made to encourage the schools of learning which were admittedly the weaker side of indigenous education, but even these were soon abandoned. The vast network of elementary schools never received the attention it deserved at the hands of government. In spite of the exhortations of thinkers like Adam, Munro, and Thompson, the directions of the Dispatch of 1854 and the strong recommendations of the Indian Education Commission, indigenous elementary schools were either killed by ill-planned attempts at reform, or destroyed by deliberate competition, or allowed to die of sheer neglect.

The results have been disastrous. It is true that attempts were made by the officers of the East India Company, and later by the Education Commission in India. For several reasons the process was slow and it could hardly compensate for the loss of the indigenous schools, with the result that the educational position of India in 1921 was hardly better than that in 1821. In the meantime, other nations of East and West whose educational advance was equal, or even in some cases it was inferior

to that of India in 1821 A.D., made such rapid advances that India soon lost her position of vantage in the civility (community) of nations and became one of the most educationally backward countries of the world!

MODERN EDUCATION IN INDIA DURING BRITISH RULE

The beginning of the modern system of education in India can be traced to the efforts of the Christian missionaries who came to this country in the wake of European traders. With the advent of the Portuguese in the fifteenth and sixteenth centuries the Roman Catholic missionaries of different denominations appeared in the field. They settled down in the different trade settlements mostly on the western coast of India and through their efforts there grew up in these settlements a new system of education.

With the extension of English influence in Northeastern India, British missionaries came and began to settle in Bengal. The first to come were the Baptist missionaries, and then throughout the seventeenth and early part of the eighteenth centuries the East India Company had encouraged missionaries to come and work in this country. They were offered free passage on the company's ships and other amenities. Thus by the beginning of the last century a new type of elementary and secondary education was introduced by the missionaries and it began to influence the educational system of the country.

During the East India Company's management education was

neglected, and in the early stages at least it was definitely ignored. From 1824 A.D. onward, small sums like one hundred thousand rupees a year were spent on education, but obviously such expenditures could not go far to meet the educational needs of millions of people.

The Education Departments of 1858 advocated the extension of elementary and secondary education through the direct instrumentality of the State, as well as the encouragement of private schools through grants-in-aid. But compared to the magnitude of the problem, adequate funds were not forthcoming. As such, the progress was slow and halting.

Thus the progress of elementary education during the last century has been really disheartening and it is mainly due to several mistaken policies. Firstly, the British Government crushed down the indigenous education system which had been in vogue in this country from times immemorial. The indigenous schools were no doubt inefficient, but they were giving some type of general education to the masses. During the second half of the nineteenth century while some of these schools were brought under the public system of education, the majority of them ceased to exist.

Owing to the disrapture of the village economic life during British rule, the countryside was impoverished, the patrons of the village schools disappeared, and a large number of indigenous schools were starved and ultimately closed down. Administrators and educators like Munro, Adam, Thompson, and others, repeatedly advised the Government to build the public system of

education on the basis of the old indigenous system, but this advice remained as mere advice. The state watched the steady decline of these poverty-stricken schools and did not spend a single pie to help them. Nothing was done to improve their character, and modern primary schools were established as their rivals. But while a network of indigenous schools was thus wiped out, hardly a few new schools were established to replace them.

Secondly, the East India Company adopted a new policy in education which is popularly known as the Filtration Theory. With a paltry sum of hundred thousand rupees sanctioned by the Charter Act of 1813, the General Committee on Public Instruction set up in Calcutta in 1823 to implement the provision of the Act found it impossible to look to the needs of the masses. The Committee therefore decided that their immediate concern was to impart higher education to educate the classes.

It was felt that if higher education is provided to the top classes, it will somehow or other "filter down to the masses". But what was intended to be the fountain head remained a stagnant pool. Education did not filter down from the higher classes to the masses.

Thirdly, the British Government neither recognized the principle of compulsory education nor acknowledged that it was the primary duty of the state to give free and compulsory education to all children of school-going age. It was a wonder that such an idea was considered too utopian at a time when England itself had recognized the principle of compulsory education.

Thus education was completely neglected because of many problems. Meanwhile, the Great War of 1914-1918 was fought and won. It brought in its train many disasters, but also a promise of political reform culminating in the Government of India Act of 1919, which incidentally stimulated interest in education.

Thus the Government of India Act of 1919 placed education for the first time in the hands of Indian ministers. In 1937, provincial autonomy was introduced with the right to control all branches of the state administration. Thus public education became a direct responsibility of popular ministers and state legislatures, who showed a great interest in education problems.

Besides the political development, a great social change came over the country under the leadership of Mahatma Gandhi who guided the national movement of the country since 1918. Under his inspiring guidance, the national movement became a mass movement, and the need for literacy amongst the masses if they were to be intelligent citizens of a democratic state became obvious.

Since 1918, however, all the state legislatures began passing acts for introducing compulsory primary education in their respective states, but the acts did not bring the desired results. Besides other causes, poverty of the masses and inadequacy of the educational budget were mainly responsible for the failure. This was the main reason which led Gandhi to work out an inexpensive plan of education, the basic education.

The progress of compulsion prior to the partitioning of the country will be evident from Table 6.

Table 6. Compulsory education in British India, 1921-37.¹

Year	Municipalities and urban areas	Rural areas
1921-22	8	--
1926-27	114	1,571
1931-32	153	3,392
1936-37	167	3,034

¹K. G. Saiyidain, et.al., Compulsory Education in India, Paris, UNESCO, 1952, pp. 147-148.

Thus the progress had not been very encouraging and especially between 1931 and 1937 the position was stationary. It was mainly due to two reasons. This period was a period of world-wide economic depression, and consequently new programs of educational development had to be abandoned. The Government adopted a policy of consolidation rather than of expansion. Inefficient schools were rooted out and only the efficient ones were allowed to exist.

With the introduction of provincial autonomy the Congress Ministers came into power in 1937 in six major provinces. Unfortunately, the Congress did not remain in power very long. The Second World War broke out in September, 1939. Differences arose between the Congress and the British Government over the question of the war and peace aims of the Allies, and the Congress resigned in 1940. Between 1940 to 1945, caretaker governments were in charge of education. Those were mainly concerned with the prosecution of war. The popular ministries came back

again in 1946 and since then they have been in power. In 1947 British power was withdrawn on the 15th of August and India became a Sovereign Independent Nation. All these years, however, were years of great stress and strain. Firstly, there was war; then there was the "Quit India Movement". Again there was the triangular fight between the British, the Congress, and the Muslim League, leading to the partition of India and the establishment of Pakistan, and finally there was the huge problem of refugees and their rehabilitation.

Thus the attention of the popular leaders was all the while drawn to one or the other serious political problem and they could not devote enough time to execute their educational plans. It is no wonder, therefore, that the educational advance under Provincial Autonomy did not come up to expectations. We shall now study in greater detail the achievements of education in India since independence.

EDUCATION IN INDIA SINCE INDEPENDENCE

A new era in the history of education in India was ushered in with the attainment of independence in 1947. The very scale and perspective of problems became different, although the planning and experience of the past provided some basis for immediate action. As the Prime Minister, Shri Jawaharlal Nehru, said in his inaugural address to the All-India Educational Conference called by the Education Minister in January, 1948:

Whenever conferences were called to form a plan for education in India the tendency, as a rule, was to maintain the existing system with slight modifications. This must not happen now. Great changes have taken place in the country and the education system also must be in keeping with them. The entire basis of education must be revolutionized.

The first four years of independence form a period of great and unforeseen difficulties. The most important of these was the influx of millions of refugees from Pakistan and the immense and urgent task of their rehabilitation to which it inevitably led. Some of the other important problems which claimed priority were: the forming of the Constitution to replace the outdated Government of India Act, 1935; the reorganization of administrative services which had been depleted by the sudden withdrawal of British officers; and the liquidation of the princely states and the creation of new and more viable units of administration. Consequently not enough attention could be given to the development of education between 1946-1947 and 1950-1951. On the basis of the Sargent Plan (new educational plan after independence), however, the states adopted a few broad schemes of expansion and improvement; and at the center the main developments include the creation of a Ministry of Education and Scientific Research and the appointment of a University Education Commission under the chairmanship of Dr. S. Radhakrishnan in 1948 and the publication of its report in the following years. In 1951-52, India adopted the policy of planned development and the First Five Year Plan (1951-55) provided for an expenditure of Rupees 169 crores for educational development (1.690 billion rupees). Its main achievements were:

(1) A large expansion of primary education; (2) the appointment of a Secondary Educational Commission; (3) the establishment of a University Grants Commission; (4) the development of basic and social education. This was followed by the Second Five Year Plan (1956-60), which provided for an expenditure of Rs 275 crores (2.750 billion rupees) and whose principal achievements were: (1) The continuance and further expansion of the schemes taken up in the first plan; (2) the reorganization of secondary education and the establishment of the All-India Council of Secondary Education and the Directorate of Extension Programs of Secondary Education; and (3) the large scale development of technical education. This is now followed by the Third Five Year Plan (1961-65) which places a great emphasis on the development of primary and technical education and continues and further expands the schemes taken up in the first and second plans. It provides for an expenditure of Rs. 418 crores (4.180 billion rupees) under education and Rs. 142 crores (1.420 billion rupees) under technical education. But even these fifteen years of planned development have revealed certain handicaps or difficulties under which educational development has to be attempted, viz., (1) the inadequacy of resources available to educational development on account of the competing claims of other sectors (education has received only about 7 per cent of the total outlay on planned development so far; (2) the unexpected, large and continuous rise in population; and (3) the rise in prices which offsets several gains in education progress. On the whole, therefore, it may be said that

the total educational progress of the country has not been able to keep pace with the large hopes and aspirations that the attainment of independence had raised. For instance, the Constitution hoped that free and compulsory education might be introduced by 1960 for all children up to the age of 14 years, but it has not been possible to reach this target.

In spite of these limitations and in spite of the large unfilled gap between "aspirations" and "achievements", it can be said that the period of twenty years between 1942 and 1966 promises to be one of unprecedented expansion in every sector of education; and this has been the greatest achievement of the post-independence period. But this very achievement has been responsible for the failure to take adequate steps to improve the quality of education. This has been the main weakness of the program; and considered along with the general failure to keep pace with national aspirations, it detracts a good deal from the glory of expansion. The progress of education in the post-independence period thus presents a mixed picture of light and shade and of gains and losses.

ELEMENTARY SCHOOLS (PRIMARY SCHOOLS) IN INDIA
SINCE INDEPENDENCE (1947)

Since 1947 fairly satisfactory progress has been made in the field of primary education. This is borne out by the fact that whereas in the major States of India there were 140,121 primary schools with 11,000,964 pupils on March 31, 1948, on the corresponding date in 1956 these figures stood at 215,320 and 17,985,074, respectively. The percentage of pupils at the primary stage to the corresponding school-going population in different states for 1955-56 is given in Table 7. The all-India percentage was 53 in that year.

Table 7. Percentage of children in primary stage to those of school-going age, 1955-56.

Andhra	Assam	Bihar	Bombay	Jammu and Kashmir	Kerala	M.P.
68.6	59.4	35.9	87.0	22.8	99.8	51.7
Madras	Mysore	Orissa	Punjab	Rajasthan	U.P.	W. Bengal
68.5	59.2	30.9	59.2	22.6	33.5	87.0

Progress of Primary Education

The expansion of primary education that has been achieved in the post-independence period so far, as well as the proposed expansion in the third plan, are shown in Table 8.

Basic education is now the accepted pattern of the educational system at the elementary level. It is an activity-

Table 8. Expansion of primary education.

Year	Total enrollment in classes I-V in millions	Percentage of enrollment in classes I-V to total population in the age group 6-11	Total enrollment in classes VI-VIII in millions	Percentage of enrollment in classes VI-VIII to total population in the age group 11-14
1946-47				
Boys	10.63	53.1	1.72	15.4
Girls	3.48	17.4	.32	2.9
Total	14.11	35.0	2.04	9.0
1950-51				
Boys	13.77	59.8	2.59	20.7
Girls	5.38	24.6	.53	4.5
Total	19.15	42.6	3.12	12.7
1955-56				
Boys	17.53	70.3	3.42	25.5
Girls	7.64	32.4	.87	6.9
Total	25.17	51.9	4.29	16.5
1960-61 (Estimates)				
Boys	23.38	80.5	4.82	34.3
Girls	10.96	40.4	1.47	10.8
Total	34.34	61.1	6.29	22.8
1965-66 (Plan target)				
Boys	30.12	90.4	7.00	39.9
Girls	19.52	61.6	2.75	16.5
Total	49.64	76.4	9.75	28.6

centered curriculum where the process of learning is correlated with the physical and social environment of the children.

Administration

The agencies responsible for administration and control of primary education are: (1) State governments; (2) local bodies--district boards in rural areas and municipal committees in towns and cities; and (3) private bodies, most of which receive aid. Table 9 shows the distribution of primary schools by managements.

Table 9. Primary schools by management, 1955-56.¹

Management	:	Number	:	Percentage
Government		64,827		23.3
District boards		33,296		47.9
Municipal boards		8,927		3.2
Private bodies		67,263		24.2
Aided		--		24.2
Unaided		3,822		1.4
Total		278,135		100.0

¹Education in India, 1955-56, Vol. I, p. 55.

Finance

There are five sources for the support of primary education: Government (federal and state) funds, local (district and municipal boards) funds, fees, endowments, and other sources, i.e., the voluntary contributions of the people. Table 10 gives

a picture of expenditure met from different sources on primary schools during 1955-56.

Table 10. Direct expenditure on primary schools by sources, 1955-56.¹

Source	Amount	Percentage
Government funds	395,510,671	73.6
District board funds	62,474,266	11.6
Municipal board funds	44,983,079	8.4
Fees	17,527,127	3.3
Endowments	6,282,164	1.2
Other sources	10,494,759	1.9
Total	537,272,066	100.0

¹Education in India, 1955-56, Vol. I, p. 75.

Primary education is free in schools situated in areas under compulsory education. Even in non-compulsory areas, fees are not charged in government and most of the local boards schools. In private schools, of course, fees are levied, which vary considerably.

Cost per Pupil. The average annual cost per pupil in a primary school amounted to Rs. 23.4 in 1955-56. It varied from Rs. 30.1 in Bombay to Rs. 13.9 in Assam.

Curriculum

Most of the states have revised their curricula of primary schools in recent years. An integrated syllabus for primary and

basic schools has been prepared by several state governments and is now being introduced uniformly in all primary and middle schools.

School Building

The housing condition of primary schools is unsatisfactory. The number of buildings owned by Government or local bodies and especially constructed for schools are few. They house about 30 per cent of the children under instruction. The majority of schools are housed in rented or rent-free buildings, most of which are unsuitable for school purposes as they are ill-lighted, ill-ventilated, and unhygienic. Hence functional school buildings are a more important need for future education and this factor will be discussed in the next section.

Educational Survey

The country has now definitely accepted the target of providing a primary school within easy walking distance from the home of every child and also a middle school within about three miles of the home of every child. From this point of view, an educational survey of the country was recently carried out. The survey showed that the educational needs of the country in this area would be met if about 100,000 primary schools and 16,000 additional middle schools are opened. Plans to establish these schools have been made, and by the end of the third plan

it is hoped to realize the target of universal provision of primary and middle schools.

The schools are now much closer to their communities. The local community is now coming increasingly forward to provide buildings, playgrounds, and land for school farms. In several areas it is making contributions for equipment for school and for provision of amenities like midday meals or school uniforms. This awakening of the community interest in primary education has been a very significant gain in recent years.

Thus this whole picture gives some reasons for the slow progress and principal developments in the field of primary and middle school education in the recent period.

SECONDARY EDUCATION IN INDIA

Secondary education generally covers seven years in all, including (1) the middle or the senior basic or the junior secondary stage of three years for children in the age group 11 to 12, and (2) the high stage of three years for children in the age group 13 to 16. The duration of these stages varies from state to state. It may be noted that the high school generally contains middle classes and in some cases primary departments are attached to them.

Secondary education was the weakest stage in Indian education in the pre-independence period and it still continues to be so. The main achievement of the post-independence period has been expansion and this has come about not as a result of any

planning, but by sheer force of circumstances. On the other hand, the attempts to reconstruct it and to improve its quality have neither been well planned nor sufficiently large in scale to produce any tangible effect.

Table 11 will show the increase that has taken place in the number and enrollments of secondary schools during the last 14 years and also the future increase anticipated in the third Plan.

Table 11. Progress of secondary education.

	:1949-50:	:1958-59:	1960-61 :(Estimates):	: 1965-66 :(Targets):
1. Number of secondary schools				
Boys	5,685	12,221	13,100	18,800
Girls	997	2,103	2,500	3,800
Total	6,682	14,324	15,600	22,600
2. Enrollment at the secondary stage in millions				
Boys	0.905	2.313	2.39	3.57
Girls	0.140	0.481	0.52	0.97
Total	1.045	2.794	2.91	4.54
3. Percentage of enrollment at the secondary stage to the total population in the age group 14-17				
Boys	8.2	17.1	18.4	23.7
Girls	1.3	3.5	4.2	6.9
Total	4.8	10.3	11.3	15.3

It will be seen that the total number of secondary schools has increased from 6,682 in 1949-50 to 16,600 in 1960-61. It is expected to rise further to 21,800 in 1965-66. One good feature of this expansion is that a large increase has taken place in the secondary schools in rural areas or for girls. The former has risen from 2,764 in 1949-50 to 6,757 in 1958-59 and may increase to 10,500 in 1965-66; and the latter has increased from 997 in 1949-50 to 2,500 in 1960-61 and may increase to 3,800 in 1965-66. The increase in enrollment is even greater than that in the number of institutions. The total enrollment at the secondary stage has increased from 1.045 million (or 4.8 per cent of the population in the age group 14-17) in 1949-50 to 2.694 million (or 10 per cent) in 1958-59 and to 2.91 million (or 11.5 per cent) in 1960-61. It is expected to rise still further to 4.56 million (15.6 per cent) by 1965-66.

Administration

Secondary education in India is a responsibility of the states. The State Department of Education works under the direct control of the Education Minister, who has a Secretary to assist him at the secretarial level, and a Director of Education as the executive head of the Department. Some of the states have set up Secondary Education Committees for advising the Government on matters of secondary education. These committees consist of official and nonofficial members.

It may be noted, however, that besides the Ministry and the Education Department, there are other departments and ministries in the states as well as at the Center directly concerned with education. The Ministry of Agriculture, the Ministry of Industry and Commerce, the Ministry of Transport and Communications, the Ministry of Information and Broadcasting, and the Ministry of Labor have under their control schools and colleges pertaining to their respective specialized branches. Often these different departments are not in touch with one another's activities; hence there is wastage of money and effort.

But the State Department of Education more or less controls secondary education. It lays down conditions regulating the procedure to be adopted for the recognition of schools, awards grants to private institutions, fixes rules regarding administration of schools, prescribes courses and selects textbooks for all standards except the matriculation (last year of school graduation).

Finance

The extent to which the secondary school expenditure was borne by different sources is shown in Table 12.

The figures of expenditure for 1955-56 show that the Government bears approximately half of the expenditure on secondary education, but it varies according to states.

Educational institutions under private management are given grants-in-aid to assist them in the expansion and improvement of

Table 12. Direct expenditure on secondary schools by sources, 1955-56.¹

Source	: Amount in rs.	: Percentage
1. Government funds	246,826,952	46.6
2. District board funds	24,930,765	4.7
3. Municipal board funds	10,761,544	2.0
4. Fees (tuition)	200,492,267	37.8
5. Endowments	15,039,455	2.8
6. Other sources	<u>28,678,730</u>	<u>6.1</u>
Total	530,194,619	100.0

¹Education in India, 1955-1956, Vol. I, p. 144.

their educational facilities, but the amount varies from state to state. The grants given may be for any of the following purposes.

1. Payment of stipends to teachers under training.
2. Payment of medical officers for medical inspection.
3. Maintenance in boarding homes of orphans.
4. Construction of school buildings and extension.
5. Furniture, apparatus, chemicals, and books for library.
6. For acquisition of lands for school buildings, hostels, or playgrounds.
7. For crafts or industrial education.
8. Maintenance grant.

But grants for all these purposes are not given by all states. The Government of India also gives grants to states for approved items.

Curriculum

The secondary curriculum generally includes: (1) English, (2) mathematics, (3) mother-tongue, (4) history and geography, (5) science, and (6) a classical language. Vocational subjects have also been introduced in some states.

Detail curriculum pattern in secondary schools is divided in two sections, as shown in the following diagram.

Secondary education

Lower (11-14)

Higher (14-17)

In this connection it may be recalled that the suggested higher secondary stage will include the program of the first year course of the intermediate stage (the pre-university course). It has been planned for three years and not four years as contemplated by the Secondary Education Commission.

The Lower Secondary Stage. The special function of the curriculum at this stage is to introduce the pupil to significant departments of knowledge. As such it should include language and literature, social studies, natural science, and mathematics (1. Secondary Education Commission's Report, p. 87). Besides these, art, music, and craft should be given due importance, as they are the media for developing aesthetic sense in children. At the same time, it will also be necessary to include physical education which is essential for building up a healthy and balanced personality. Thus the general pattern of curriculum is as follows.

1. Languages

(a) Federal language (Hindi) - 3 periods.

(b) Mother tongue (in areas where the mother tongue happens to be Hindi, one modern Indian language should be taught as the second compulsory language) - 3 periods.

(c) English or advanced mother tongue or another Indian language - 4 periods.

2. Social studies--elements of history, geography, and civics - 5 periods.

3. General science - 3 periods.

4. Mathematics--arithmetic, elementary geometry, and elementary algebra - 5 periods.

5. Art or music - 2 periods.

6. A craft - 5 periods.

7. Physical education - 5 periods.

The Higher Secondary Stage. Recommendation of the Secondary Education Commission is that the curriculum at this stage should consist of the following.

A. Languages

1. Mother tongue or regional language or a composite course of the mother tongue and a classical language.

2. One other language to be chosen from the following:

(a) Hindi (for those whose mother tongue is not Hindi.

(b) Elementary English (for those who have not

studied it in the middle stage).

- (c) Advanced English (for those who have studied English in the earlier stage).
- (d) A modern Indian language (other than Hindi).
- (e) A modern foreign language (other than English).
- (f) A classical language.

B. 1. Social studies--general course (for the first two years only).

2. General science including mathematics--general course (for the first two years only).

C. One craft to be chosen from the following list (which may be adapted to suit local needs):

- (a) Spinning and weaving.
- (b) Woodwork.
- (c) Metalwork.
- (d) Gardening.
- (e) Tailoring.
- (f) Typography.
- (g) Workshop practice.
- (h) Sewing, needlework, and embroidery.
- (i) Modeling.

D. Three subjects from one of the following groups:

Group I (Humanities)

- (a) A classical language or a third language from A(2) not already taken.
- (b) History.

- (c) Geography.
- (d) Elements of Economics and Civics.
- (e) Elements of Psychology and Logic.
- (f) Mathematics.
- (g) Music.
- (h) Domestic Science.

Group II (Science)

- (a) Physics.
- (b) Chemistry.
- (c) Biology.
- (d) Geography.
- (e) Mathematics.
- (f) Elements of Physiology and Hygiene (not to be taken with Biology).

Group III (Technical)

- (a) Applied Mathematics and Geometrical Drawing.
- (b) Applied Science.
- (c) Elements of Mechanical Engineering.
- (d) Elements of Electrical Engineering.

Group IV (Commercial)

- (a) Commercial Practice.
- (b) Bookkeeping.
- (c) Commercial Geography or Elements of Economics and Civics.
- (d) Shorthand and Typewriting.

Group V (Agriculture)

- (a) General Agriculture.

- (b) Animal Husbandry.
- (c) Horticulture and Gardening.
- (d) Agricultural Chemistry and Botany.

Group VI (Fine Arts)

- (a) History of Art.
- (b) Drawing and Designing.
- (c) Painting.
- (d) Modeling.
- (e) Music.
- (f) Dancing.

Group VII (Home Science)

- (a) Home Economics.
- (b) Nutrition and Cookery.
- (c) Mother Craft and Child Care.
- (d) Household Management and Home Nursing.

Thus every higher secondary pupil will study three languages and the core subjects. Besides these, he will offer (1) a craft, and (2) three subjects from one of the specialized groups of the section.

E. A craft is a very valuable medium for the development of the emotional side of the human mind. The special subjects should be selected with reference to the pupil's future needs as well as his tastes and aptitude. In addition to the subjects enumerated above, physical education will be compulsory for all.

Accommodation and Equipment

Buildings and equipment continue to be unsatisfactory, and this is in spite of the fact that the public is increasingly prepared to help in overcoming the deficiencies. This is mainly due to the vast expansion in secondary education, and at times leaders in despair say that education must go ahead even without proper buildings and equipment (Progress of Education in India, 1947-52, p. 63). But it is true fact that since independence considerable advance has been made in the development of a program for the education, and according to new development and changes there is more need for the well equipped school buildings. The majority of school buildings are unsuitable for school purposes, as they are ill-lighted, ill-ventilated, and unhygienic. Hence a new type of school buildings is an immediate need for the proposed educational program. Some of these factors will be discussed in the next section.

PRE-PRIMARY EDUCATION IN INDIA

Preschool training is a relatively new need for every community. The appropriate building type and its architectural expression have not developed very far. Education of the young child between two and six outside of the home has had but a short history. The origin of early childhood education starts in Europe, and the development of Indian preschool education has also been influenced greatly by the same European methods.

The movement of early childhood education outside the home commenced with Friedrich Froebel, who originated the kindergarten school at Blankenburg, Germany, in 1837, for young children from two to six. Froebel was aware that he had created an entirely new form of school, different in principle from all previous attempts to take care of children.¹ Froebel recognized that the methods and materials of this training have to take place in the form of the child's natural activity, play.

Then a second development started in nursery schools which were in slum areas for the children of those mothers who used to go out for work. Today they are quite popular in every society. The nursery schools are generally meant for children in the age group 2-4.

Now finally in the present century came the Montessori Schools. The founder, Maria Montessori, worked out her methods among the poor as well as abnormal children in slum areas. She prepared plentiful scientific apparatus. These have greatly simplified teaching.

Now let us see the meaning of pre-primary education. This education begins from conception and continues until the child's compulsory schooling begins; a pre-primary school generally takes care of children in the age group of two to six. It adopts one or all three systems described in the preceding section and has the following aims.

¹H. H. Waecher, "Schools for the Very Young," page 10.

1. To provide healthy external conditions for children, such as light, sunshine, space, and fresh air.
2. To organize a healthy, happy and regular life as well as continuous medical supervision.
3. To assist each child to form for himself wholesome personal habits.
4. To give opportunity for the exercise of imagination and for the development of many interests as well as skills of various kinds.
5. To give experience of community life on a small scale where children of similar as well as varying ages work and play with one another.
6. To achieve a real unity with home life.

Thus the preschool looks after the physical, intellectual, and social needs of young children. It provides a healthy environment and takes care of them when they are most susceptible to diseases. It also prepares them for compulsory education with well-formed habits and alert minds. Formal instruction is almost absent in such instruction because its daily program consists of happy and joyous pursuits and activities in which the distinction between work and play disappears. The teaching methods of Froebel or Montessori are practiced, and great importance is attached to play, speech training, story telling, acting, rhythmic movements, singing, dancing, nature study, and handwork. A fixed daily routine is followed, and children are allowed to sleep or take rest or partake of their meals at regular intervals. These measures help the preschool child to develop in himself habits of personal hygiene and desirable

attitude toward his individual self and his fellow brethren.

In India pre-primary education is still in its infancy. The start has just been made but the movement appears to be popular. In 1951-52 there were 330 pre-primary schools in the entire country. By 1957 the number rose to 773.¹ These institutions are known by different names: nursery infant, pre-primary, balmandir, kindergarten, Montessori, prebasic, and the child development school. Most of them combine the play way method with some of the activities of the Montessori and kindergarten schools.

The majority of the institutions are, however, mere classes attached to some schools and are situated in urban areas. The Government hardly maintains a few institutions of its own, but it encourages private agencies on a grant-in-aid basis. A large number of private schools or classes are not properly conducted--equipment is poor, the staff is untrained, and records of children's health, interests, and habits are seldom maintained. In short, pre-primary education in this country is faced with the following difficulties today: women teachers are not available, there is not adequate provision for training pre-primary teachers, scientific research bureaus and child laboratories are unknown in the country, and there is a dearth of suitable juvenile literature.

The importance of pre-primary education has been fully recognized in our country. The stay of Dr. Maria Montessori in

¹India, 1952, p. 110.

India (1940-48) gave a great impetus to the movement. Hundreds of teachers trained in her short and long intensive courses have opened their own classes or schools in cities or big towns.

Pre-basic Education

A new outlook in pre-primary education has been given by the experiment in pre-basic education, which begins from conception and continues until the age of seven. It is divided into four stages: (1) from conception to birth, (2) from birth to two and one-half years, (3) from two and one-half to four, and (4) from four to six. The first two stages are for the mother and the child together, and this is why wherever there is a pre-basic school, there is some arrangement for a child welfare center advising the mother about her health and the health of her child.

At two and a half years age, the child attends pre-basic school and continues until he is seven. The school is more or less part of the child's home, and the teacher has to give much time to the child's home and parents. Attention is paid to the following aspects of the child's training.

1. Physical nature.
2. Medical care, personal and community cleanliness.
3. Self help and self reliance.
4. Social training.
5. Creative educational activities.
6. Speech training and children's literature, songs,

stories, dialogues, and conversations.

7. Development of mathematical sense.
8. Nature study.
9. Music and rhythm.
10. Art.

Thus the ideology of the pre-basic education is influencing the activities of pre-primary schools of this country. Some still draw their inspiration from the kindergarten, Montessori, or the child development system. But the aim of the same systems is to give proper training for preschool children. The provision for an adequate number of pre-primary schools in our country is yet a distant dream, especially when enough money is not forthcoming for universal compulsory primary education. Yet the difficulty will have to be solved on its own merits. It is very necessary that we should concentrate a good deal of our attention on the improvement of our pre-primary education. The foundations of life are laid in the pre-primary school which is the citadel of early childhood.

SCHOOL PLANNING FOR THE FUTURE

Now it is proposed to discuss the principles and sketch the portrait of the school of the future--the school, not as it is at present, but as it can be if devotion and intelligence and understanding are brought to its service. The ordinary Indian school as we know it today, has obviously failed to exploit most of what is worthy and valuable in the nature of youth; it has

failed to tap the sources of their creative energies and to release them into fruitful channels. These schools are usually places where formal training is provided in certain technical skills like reading, writing, and drawing, or certain prescribed subjects of study like geography, history, and science.

Let us consider some outstanding causes for the above statement. In the first place, the uniformity of method, the rigidity of curriculum, and the narrow outlook of our schools deny individual children the chance to express themselves in congenial ways. There is no recognition or appreciation of psychological types. Children are herded into a dull, bookish, and passive school environment at a time when all the forces of their being demand that they should be playing actively and working joyously in the open air. There is no provision for those creative and constructive activities, manual and mental, which give room for the expression of the children's individual talents.

Another outstanding problem in education beside that is of poverty, ill health, and the general lack of physical and cultural amenities. Thus India faces today a large number of very complicated problems pertaining to education, economic, social, cultural, political, and what not.

Hence planning for the future school education in India is a more complicated problem and it is not only dependent on architectural development but it is a co-operative work of many fields, and particularly for this study. Now more about planning for school buildings than educational problems will be discussed.

A people's school must be based on the people's needs and problems. It should reflect all that is significant and characteristic in the life of the community in its natural setting. In the rural areas, the school should help the children to realize sympathetically the problems of rural life. Hence design for such rural schools should be different from others. Similarly, in an industrial area the school should gradually make the child familiar with industrial tools and the atmosphere should be such that he should appreciate both the technical and the human elements of the situation.

Hence in both rural and urban areas the school should become a center of adult or social education.

All schools should organize some sort of social survey which would undertake to investigate into some of the needs and problems of the neighboring community life, e.g., conditions of the roads, the drainage of the towns or the village, the hygienic and sanitary conditions of the surrounding areas, the supply of foodstuffs, the main industries and occupations of the locality, and so forth, and then it will be more economical to develop the proper school plant as per community needs.

Education has changed according to new needs. More changes are expected in the future. The scope of the curriculum is going to be broad. "Learning by doing" is replacing "Learning by listening". School buildings require many and varied activities. Traditional school structures cannot be satisfactorily used. Educators need modern structures, structures that are flexible enough to conform with the changing needs of education.

Buildings are fundamental in a school program and very little progress has been made toward proper housing for education in India. Many school buildings are overcrowded and ill-equipped; hence one of the most pressing educational problems facing India today is adequate housing for an increasing and shifting enrollment and an expanding program, causing congestion in many elementary and secondary schools.

Thus more school buildings are needed in the near future and the school house as the educational center for the youth of our land, it is readily appreciated that our school buildings should be expressive of our highest standards in architectural design and in building construction. After independence, India faced many problems, but even though our methods of teaching have been improved, new structural materials invented, the plans and structural design of our school buildings must change to conform to these new conditions. We need modern schools for our present and future needs, schools that are modern in plan, in construction, in design, and in equipment. Spaciousness should be the basis of the plan of the modern schools. Simplicity should be the keynote of its construction, and its exterior design should express in plain and definite terms its interior use.

Climate

The characteristics of school architecture depend upon the natural environment. Hence essentially school building, and for

that matter planning of any building in the tropical country like India is to provide against climatic conditions, like heat and humidity. Conditions of high temperature necessitate that buildings are so designed as to admit as little heat as possible within a building. This involves consideration of thickness of walls, materials to be used, size of openings, shading of the buildings, insulation, and so forth. While humid conditions are the more difficult and longer lasting in tropical India, monsoons extend as many as four months in a great part of India, while high temperatures extend for a month and a half only. These occur usually before monsoons, say June and half of July. But humid conditions persist into the month of October from July.

Hence planning of school buildings should consider all these environmental and climatic conditions. Principles of planning should encourage air movement within the rooms used by scholars. Refer to Plate XVIII for details of ventilation and natural air circulation.

Planning Pre-primary Schools

We have examined pre-primary education in India in the last sections. This education is still in its infancy in this country. The start has just been made, and the movement appears to be popular, but appropriate building types and their architectural expression have not developed very far. In 1951-52 there were 330 pre-primary schools in the entire country. By 1957, the number rose to 773. These institutions are known by

different names--nursery, Montessori, pre-primary, balmandir, kindergarten, pre-basic, and child development schools, and these schools are generally meant for children in the age group 2-6. Now here in this section more about planning than other educational problems will be studied.

Space Requirements. Regarding size of schools, there exists no hard and fast rule concerning the ideal size of pre-primary schools. The size of school depends on the number of students enrolled. The main elements of space in the pre-primary school are classified as the playrooms, administration unit, and outdoor areas.

Playroom or Group Room. In general the playroom provides space for toilet, observation area, lockers, and storage where needed. A playroom is the basic element of the pre-primary school and should be analyzed very carefully. The playroom, as the transition place between home and school, should retain as much of the home atmosphere as is practical. The playroom as the center of pre-primary school activities serves many different purposes. It is the workshop, the art studio, the scene of housekeeping and dramatic play, or it may be used for music or story groups. This unit is a self-contained unit, having its own entrance and playgrounds.

The space allowance per child will depend somewhat upon his age or, in other words, upon his work and play needs. Preschool children require somewhat larger space for their activities; approximately 40 square feet of floor space per child are necessary.

Toilet and lavatory facilities within the playroom unit

are essential.

An observation room will, in general, be provided only in schools where observation for clinical or training purposes is carried on, although schools where many visitors are expected will sometimes have special rooms for observation. These rooms are dark and narrow, with seats ranged behind fine mesh screen (or one-way vision glass) so that visitors can observe the children without being seen. They should be entered from outside the playroom. (Refer to Plates V and VI for model photographs of child development school.)

Administration Unit. The administration unit provides space for reception and waiting room, office, conference room, rest-room, teachers' room, toilet, and storage as needed. Also common to administration and playrooms space is provided for health inspection room, isolation room, food preparation and dining.

The administrative rooms consist primarily of conference room for parent-teachers meetings, an adjacent office near the public entrance for the director or principal of the school, and a teachers' room which is in a convenient but quiet location and large enough to permit needed rest. Closet and toilets for teachers and parents are obviously required.

The health inspection room should be located near the entrance, and can be combined with the isolation room. The purpose of the isolation room is to receive children who are very ill or with contagious disease (preferably right after the health inspection in the morning, before the child joins the group). In case of accident, first aid can be given in this room. The

medical room shall contain a medicine cabinet and desk for nurse or physician and a filing cabinet for health records. (See Plate VI for example.)

Outdoor Areas (Outdoor Playroom). Children need plenty of outdoor play; hence the outdoor playroom and indoor playroom should be connected. The size of the outdoor playroom should allow for approximately 100 square feet of play space per child. There should be plenty of shade either from trees or overhangs from the buildings.

Outdoor areas will vary with climatic conditions but can generally include lawn, sandbox, wading pool, tricycle track, garden, and outdoor blocks.

The equipment and facilities which can be used at various age levels are numerous. All of the equipment will be of the low type in accordance with the size of small children. (Refer to Plate VI and model photographs of child development school.)

Planning Elementary Schools

Elementary schools play a vital role in education. They help children develop their minds and discover and nurture their talents and abilities. The general aim of elementary education in India is the fullest development of each child. The goals are both individual and social in nature. They grow out of the basic needs of children and the social demands of our society. They are concerned with the development of individuals as well as interaction in a social group.

We know that our today's elementary school program is quite different from the traditional program of yesteryear, and its expanded activities and services demand more space and facilities. Actual school plants must meet the needs of the community--not only providing sufficient space to accommodate the school population but also providing the right kind of space.

In planning elementary schools, space is the common denominator of education and architecture, and it is the architect's job to interpret the curriculum in terms of architecture. The main elements of space in the elementary school are classified as the classroom unit, the administration unit, the recreation unit, the assembly unit, the dining unit, and special unit.

First consider the classroom unit for children spend more time in this area than in any other. For this reason classrooms should be located in such a way to take advantage of sun and breeze.

The elementary classroom unit may be divided into three interrelated parts--the class area, the studio, and the outdoor classroom. The disposition of these three parts should be such as to allow good overall supervision of all parts by the teacher, from any point in the classroom unit.

The Class Area. The size of an elementary classroom should not exceed 40 pupils to carry out an effective program. The size of the class area should not be less than 35 square feet of floor space per pupil. Main source of light should come from one direction, but it is more desirable to have clerestory windows in the opposite wall to permit evenly distributed and

well-diffused light as well as cross ventilation, which is more important in tropical India.

There should be much built-in equipment storage space for books, magazines, stationery, and so forth.

The Studio. The studio, or work place, is an integral part of the classroom unit--usually a space in the classroom. The studio should contain work bench, tool panel, sink, and equipment storage.

The Outdoor Class Area. The outdoor classroom should be adjacent to the indoor classroom to allow classroom activities to expand into the open air. The outdoor class area should not be less than 70 square feet of floor space per pupil. It is desirable to have a hard-surfaced pavement next to the classroom. It is advisable to plant trees and shrubs between the outdoor classrooms. This gives good screening and good sound break between classrooms. (Refer to Plates VI, VIII, and IX for model photographs of elementary child development schools.)

Administration Unit. The administration unit should be situated on the plan so that visitors or parents coming to the school for the first time will have no trouble in locating it and will not have to go through the instruction area. The administration unit should be directly connected with the main corridor to allow good supervision of the other units.

In general, the administration unit provides space for principal, secretary, reception for the students and visitors, clinic, teachers' lounge, conference room. These may be separate rooms or space within one large room, depending upon the

size of the school.

Recreation Unit (Playground). The size of playground should allow at least 250 square feet of play area per pupil enrolled in the school.

The elementary school should provide outdoor space for such games as baseball, tennis, cricket, soccer, football, and many other native games. These facilities will be used in the day-time by the students and in the evening by adults. The multipurpose unit will serve sometimes as an indoor playroom.

The Assembly Unit. Assembly and dramatics are very valuable units in the elementary schools and every school should have assembly facilities, either an assembly room or multipurpose hall with a small stage. The design of these rooms depends on the type of program to be carried on.

The size of assembly or multipurpose unit should allow at least 10 square feet of floor space per pupil. This figure includes aisles, but does not include the stage or the dressing rooms. This multipurpose unit may serve the following activities, according to the needs of the school.

1. As a playroom for class groups.
2. As an assembly center for the entire school.
3. As the folk and rhythmic dance center for two or three classes.
4. As a music room.
5. As a gathering place for pupils at the beginning of school days.
6. As a lunchroom.

7. As a physical education center for children.
8. As an area for community fairs and school and community exhibits.

(See Plate IX.)

Special Units. These would contain space for the music room, the art room, and the library.

The Music Room. The music room should be isolated from classroom units as much as possible. In determining the site, use approximately 30 square feet of floor space per pupil. Control of sound is of main importance and the room should be acoustically treated.

The Art Room. Light is the important factor in the art room. There should be enough space for exhibit of student work and there should be adjoining storage room. Regarding the size of the room, 30 square feet of floor space per pupil may be used.

The Library. The main library in an elementary school should be centrally located to all classrooms. Allow approximately 25 feet of floor space per reader. Generally, the library accommodates about one-tenth of the school enrollment. The library should have ample natural light and ventilation. The library must be isolated from all noise sources. The more sound-absorptive material on wall and ceiling surfaces, the better. (See Plate IX.)

Planning Secondary Schools

During the last three decades, the various stages of education, from the primary level to university and higher technological education, have been surveyed by competent committees and commissions and gradually the outlines of a co-ordinated pattern of education is beginning to emerge which will be in harmony with the needs and aspirations of the people. There is now fairly clear understanding of what needs to be done but still a large gap between what is and what might be. So far as secondary education is concerned, it occupies a pivotal position in the program of educational reconstruction. It provides teachers for our primary schools and students for our colleges and universities and this determines the quality and standards of education at both ends. As a result of this realization, increasing attention is being given to the reconstruction of secondary education--its aims and objectives, its methods of teaching and assessment, its approach to social training and discipline.

In order to implement this approach in practice, we are gradually establishing a new type of secondary school, the "multipurpose" school, with a broad-based and diversified curriculum, which includes new vocational and practical subjects in addition to the traditional curriculum. Hence our changing pattern of education needs more functional school buildings.

Also there is a large and rapid increase in the number of schools and their enrollment, due both to increase in educational

demand and increase in population. An idea of this tremendous expansion can be formed from the fact that between 1950 and 1960, the number of secondary schools increased from 7,288 to 16,600 and the number of students from 1.2 to 2.9 million. By the end of the third plan (1965-66) this is expected to go up to 4.5 million. Hence it is a true fact that India needs more school buildings in the near future and planning should be done according to our new needs of the curriculums and the educational philosophy.

The actual school plant must meet the needs of the community. Hence providing sufficient and the right kind of space is more important in school planning. A secondary school plant will serve both the youth and the adults of a community. Its plan should be modern and progressive.

Let us consider types of units required for secondary schools. Generally the following units may be required for all secondary schools.

1. Administrative area
2. Health suite
3. Classrooms
4. Arts and crafts
5. Shops or technical unit
6. Auditorium
7. Cafeteria
8. Gymnasium
9. Science
10. Music

11. Library
12. Playground
13. Parking for cars and bicycles
14. Services
15. Utilities.

Administrative Area. The number and types of administrative facilities required for a secondary school may well be determined by the size of the school. Generally the following areas may be required for all schools.

1. General office
2. Principal's office
3. Waiting room
4. Assistant principal's office
5. Record files room
6. Conference room
7. Storage space
8. Toilets.

Whatever the size of the administrative unit, it should be located centrally with respect to the total activity of the school. It should occupy a position near the main entrance of the building and it should be functionally planned and aesthetically satisfactory.

Health Suite. Health units and administrative units are often considered the central core providing services to the total school. The health area must provide space for nurse's offices, and a room for cots which can serve also as an auxiliary examination room. Also there must be provision for a small waiting room.

Classrooms. The fundamental principle in classroom design is that the space should be planned to support and promote the instructional program to be offered in any particular room. The size of the room, its general layout, the furniture, and other facilities must all be related to the functional demands of the curriculum itself.

A classroom is essentially a multipurpose room on a small scale where the student can do many things. Hence there must be sufficient space provision to arrange and rearrange groups of students to fit the varying activities, needs, and interests.

All furnishings must be of a type and design to permit flexibility. Furniture must be movable and light, so that students can rearrange tables and chairs to suit the activity. Also it must be possible to stack and store the furniture in a small space.

A good visual environment is one of the major requirements of classrooms. The main source of light should come from one direction, but it is even more desirable to have windows in the opposite wall to permit distributed and well-diffused light as well as cross ventilation, which is more important in tropical India. (Refer to Plate XVIII for example.)

Good hearing conditions in a classroom demand four basic requirements: (1) a sufficiently low level of basic ground noise, (2) adequate separation of successive sounds (reverberation control), (3) proper distribution of sound within the space, (4) sufficient loudness of sound.

Arts and Crafts. Arts and crafts area will include space

for drawing, painting, sculpturing, fabrics, handicrafts, et cetera.

In this unit special consideration should be given to lighting and location of the room. This room should be provided with an abundance of storage shelves, drawers, cupboards, work sink, exhibit counters, filing cabinets, large tackboard area, et cetera. The art room should have provision for display of art objects outside the classroom. The size of the art room should allow 35 to 40 square feet of floor area per pupil exclusive of storage.

Shops or Technical Unit. In general, a technical unit provides space for general shop, woodwork, metal work, and mechanical drawing or drafting room. Shop rooms should provide facilities for planning, investigating, testing, conferring, demonstrating, teaching with visual and auditory aids, and evaluating pupil development, as well as for manipulating tools and other equipment.

Special consideration should be given to safety of pupils and teachers in planning school shops. Particular attention should be directed toward provision of adequate areas for each activity.

The amount of space needed for each shop in a particular building should allow at least 50 to 75 square feet of floor space per pupil. In addition tool and supply storage are necessary in each shop. (Refer to Plates XII, XIII, and XVIII.)

Auditorium. In designing an auditorium, a clean understanding of its functions by all concerned is important.

The size of the auditorium will be governed by the size of the school and school policies and program. Seating should be fixed and should be selected and arranged for safety, comfort, sight lines, and acoustics.

The stage should be located so that it is directly accessible from the corridors or other adjacent rooms without requiring one to pass through the main part of the auditorium. A stage depth of 25 or more feet is desirable in large auditoriums for secondary schools.

Provision should be made for the storage of stage properties and other equipment.

Special attention should be given to acoustical properties to promote ease of listening throughout the seating space. Such consideration will involve the shape and dimensions of auditorium, wall and ceiling materials and coverings, floor materials, and upholstery materials. For reverberation time and acoustical design refer to Plate XIX.

Cafeteria. The cafeteria probably is one of the places most easily adapted for multipurpose functions. Secondary school dining area must be recognized as a center for students and public social activities as well as an eating space. Even as a place to eat, however, human values are being attached to the type of environment that is provided. These demands require special consideration relative to the space allocation and architectural design. Also this room should require enough space for kitchen and storage facilities. (Refer to Plates XII and XIV and model photographs of secondary school.)

Gymnasium. The gymnasium is the main element of the physical education plant. In general, it should be a large, well-ventilated and well-lighted room. The size and shape of the gymnasium will vary with the extent of the program. In general, a gymnasium should provide indoor space for such games as basketball, badminton, tennis, and other native games.

Adequate storage space must be provided for equipment which will be used in the room by the school and community. (Refer to Plate XIII and model photograph of secondary school.)

Science. Smaller schools may need to utilize one room for more than one, or perhaps all, of the specialized sciences. Larger schools usually provide separate rooms for biology, chemistry, physics, and other sciences.

Every science room should have an adequate, adjacent storage area. Also there should be provision for preparation room and the preparation area should have, as part of its equipment, a rolling cart or table upon which apparatus may be set up and moved to the classroom.

Adequate provision should be made for health and safety in the science area. (Refer to Plates XIII, XIV, XV, XVII, XVIII.)

Music. It is desirable to locate music rooms adjoining or near the auditorium stage.

Special sound control is essential for all music rooms. Sound from the music room should not interfere with the work in the quiet areas of the building, but care must be taken not to reduce the reverberation period below the point necessary for desirable brilliancy.

Special attention should be given to built-in wall cases and adequate storage for instruments. For acoustical details refer to Plate XIX.

Library. The following areas should be provided for the library.

1. Reading and circulation center
2. A work room
3. Storage space and bookstacks
4. Conference room
5. Space for screening and listening
6. Office space for the librarian.

The library should be centrally located to all classrooms. Allow approximately 25 square feet of floor space per reader. Generally, library accommodates about one-tenth of the school enrollment. The library should have ample light and ventilation. It must be isolated from all noise sources. The more sound-absorptive material on wall and ceiling surfaces, the better. (Refer to Plates XIV and XVI and model photographs.)

Playground. The total amount of space required for the playground depends upon the school program, kinds of play and recreational area needed, and the size of groups to be expected to participate.

Generally, a secondary school should provide outdoor space for games such as cricket, basketball, tennis, hockey, soccer football, and other Indian games like kabadi, aty-paty, et cetera. Refer to plans and model photographs.

Proposed School Campus at Hyderabad, India

Up to this point we have been concerned with educational programs and general planning. Also we have examined the progress of education and present a mixed picture of light and shade and of gains and losses and have come up with a proposal which we believe provides an answer to our present and future educational needs.

Now it is next in order to examine an actual proposed school plant design. The proposed site is near Hyderabad city and located in Rajendranagar campus area. The Rajendranagar community is ten miles from Hyderabad city and requires a well-equipped school campus design for their immediate and future needs.

A temperate climate and fairly level site were chosen. This including the buildings, gardens, game fields, and parking areas occupies approximately thirty-five acres. It is bounded on the northwest by Esi river and on the east by a main vehicular artery which connects it to the adjoining residential and campus areas, and the business and industrial section of Hyderabad city. To the north university campus area, green strips extend into these adjoining campus sections, providing pedestrian access to the school and supplementary game and recreation areas to be used jointly by the school and the Rajendranagar campus community.

Playgrounds are placed well away from the school classrooms, the intermediate places being for school gardens, open-air teaching, and courts. By providing good orientation, minimum sun

protection to the building is given by means of sunbreakers. Covered shades have been designed for bicycles under the cafe, at a little distance from the entrance. (Refer to Elevation Example.)

This school campus houses approximately 1,500 young people. In this building complex are provided spaces and facilities covering a complete range of physical and mental interests. It is a large building group. The building units are closely joined and some of the units cover large areas of interior space. Fifteen hundred students from different ages, exploring the whole range of human interests, require large areas and large buildings for each unit such as Child Development School, Elementary School, and Secondary School. These are scaled down to the individual, with spaces and equipment assigned to these individuals, and with other building features such as commons room, the dining facilities, and the open-air courts which encourage the development of friendships and which dignify such enjoyments as eating and playing games. A large school building campus should create a friendly atmosphere and it is hoped that this one is.

The main characteristic of the design of this school campus is the triangular form of the openings on its front facade (corbeled brick arch-load bearing walls). The reasons for adopting this form is that they are cheaper than normal verandha (corridor) openings and it is also possible to construct them economically in buildings four to five floors high; they are more effective against sun and rain as compared to traditional openings; no shuttering is required in their construction; they

avoid the use of concrete and steel which are relatively more expensive building materials in India; they are an equilibrium structure by themselves and do not cause any lateral thrust; and, lastly, they are powerful forms and have great architectural appeal.

Program of Space Requirements--
Pre-primary Unit

Child Development School

A. Kindergarten - Two Units

Indoor play area, 1,000 sq.ft.

Outdoor play, 2,000 sq.ft.

Semi-open play, 950 sq. ft.

Toilet, 80 sq.ft.

Storage space, 100 sq.ft.

Play equipment storage, 100 sq.ft.

B. Pre-kindergarten - Two Units

Indoor play, 1,000 sq.ft.

Outdoor play, 2,000 sq.ft.

Semi-open play, 950 sq.ft.

Storage, 100 sq.ft.

Play equipment storage, 100 sq.ft.

C. Administration

Reception and waiting, 150 sq.ft.

Principal's office, 125 sq.ft.

Conference room, 200 sq.ft.

Teacher's room, 200 sq.ft.

Toilet, 100 sq.ft.

Storage space, 100 sq.ft.

D. Health Inspection Room

Isolation room, 120 sq.ft.

Medical unit, 150 sq.ft.

Storage, 80 sq.ft.

Toilet, 100 sq.ft.

E. Observation Areas

F. Food Preparation and Dining

Dining, 1,000 sq.ft.

Kitchen, 200 sq.ft.

Food storage, 100 sq.ft.

Toilet, 80 sq.ft.

Program of Space Requirements--
Elementary School

A. Classrooms--First to fourth grade; total units
for each grade is two.

Classroom, 950 sq.ft.

Outdoor play, 1,900 sq.ft.

Storage space, 150 sq.ft.

Toilets, 250 sq.ft.

B. Administration

Principal's office, 120 sq.ft.

Reception and waiting, 200 sq.ft.

Teacher's work and rest, 400 sq.ft.

Health inspection, 125 sq.ft.

Conference room, 250 sq.ft.

Storage, 125 sq.ft.

Toilets, 150 sq.ft.

C. Multipurpose room (see Table XIII, pages 87 and 88,
for acoustical analysis)

Hall, 3,000 sq.ft.

Stage, 80 sq.ft.

Kitchen and storage, 240 sq.ft.

Toilet, 150 sq.ft.

D. Library

Area for reading, 950 sq.ft.

Storage space, 125 sq.ft.

Outdoor reading, 950 sq.ft.

Toilets, 150 sq.ft.

E. Custodial Space

Custodial storage, 200 sq.ft.

F. Outdoor Playground

Area approximately 35,000 sq.ft.

Program of Space Requirements--
Secondary School

Administration

Reception and waiting room, 360 sq.ft.

Principal's office, 165 sq.ft.

Vice-principal's office, 140 sq.ft.

Secretary's office, 100 sq.ft.

General office, 250 sq.ft.

Conference room, 140 sq.ft.

Storage space, 150 sq.ft.

Toilet and washrooms for men and women, 250 sq.ft.

Custodian's office, 80 sq.ft.

Teachers' work and rest room, 500 sq.ft.

Health Suite

Medical office, 160 sq.ft.

Rest room, 100 sq.ft.

Storage space, 50 sq.ft.

Toilet, 80 sq.ft.

Classrooms

Language

Mother tongue, 1200 sq.ft.

Sanskrit, 1200 sq.ft.

English, 1200 sq.ft.

Hindi, 1200 sq.ft.

Ardhmagdhi, 1200 sq.ft.

Classical language, 1200 sq.ft.

Mathematics

Algebra and Geometry, 1200 sq.ft.

Social Studies

History, 1200 sq.ft.

Geography, 1200 sq.ft.

Civics and Administration, 1200 sq.ft.

General Science

Physics, 2325 sq.ft.

Chemistry, 2025 sq.ft.

Biology, 2025 sq.ft.

Arts and Crafts

- Drawing and painting, 1650 sq.ft.
- Spinning and Weaving, 1650 sq.ft.
- Crafts, 1650 sq.ft.

Technical

- General Metal (machine shop), 2325 sq.ft.
- General Woodworking, 2325 sq.ft.
- Drafting (Machine Drawing), 2025 sq.ft.

Library

- Library reading room)
- Work room) , 2400 sq.ft.
- Conference room, 150 sq.ft.
- Storage space and book stacks, 150 sq.ft.
- Office space for librarian, 150 sq.ft.
- Toilets, 250 sq.ft.

Cafeteria

- Cafeteria, 4000 sq.ft.
- Cafeteria kitchen)
- Office) , 350 sq.ft.
- Refuse room)
- Storeroom } , 300 sq.ft.
- Toilets }

Auditorium

- Auditorium, 3900 sq.ft.
- Stage, 1050 sq.ft.
- Dressing rooms)
- Music room } , 1000 sq.ft.
- Storage space }

Toilets, 400 sq.ft.

Gymnasium

Gymnasium space)
Locker rooms) , 5600 sq.ft.

Gymnasium shower rooms, 256 sq.ft.

Storerrooms, 300 sq.ft.

Toilet rooms, 300 sq.ft.

Exterior Playground

Custodian's Office, 130,000 sq.ft.

Office)
Storerroom) , 200 sq.ft.
Toilet)

Table 13. Acoustics details for multipurpose room.

Required absorption	: 125 cps	: 500 cps	: 2000 cps		
Optimum reverberation time	1.33	0.93	0.93		
S (surface area), $V/A \times 0.05 = t$	$tf = t$				
	$t_f = 1.25$				
	$R = 1.45$				
Total units of absorption	2330	3315	3315		
Absorption furnished by room					
	: Area	: α	: $S \bar{\alpha}$: α	: $S \bar{\alpha}$
Air	62000	-	--	--	186.00
Brick & wall open texture	3804	0.02	76.08	0.03	114.12
Floor polished shahabad tiles (Total 2760 sq.ft.)					142.16
Deduct shading 20%	2208	0.01	22.08		
Deduct shading 40%	1656				
Deduct shading 60%	1104			0.01	16.56
Wood paneling, 3-ply, on battens, 2" acoustic felt in air space					22.08
Wood floor (stags)	1434	0.50	717.00	0.25	358.80
Doors	350	0.15	52.50	0.10	35.00
Ceiling	84	0.10	8.40	0.05	4.20
Glass opening	3250	0.02	65.00	0.02	65.00
Ventilators (grills 50% void)	504	0.10	50.40	0.05	27.20
People (2/3 full)	140	0.15	21.00	0.35	49.00
Wood chairs (vacant)	217	2.00	434.00	4.00	868.00
	108	0.15	16.20	0.17	18.36
Total			1466.66		1556.24
					1865.34

Table 13 (Concl.)

Required absorption	Area : α	125 cps : $S \bar{\alpha}$	500 cps : α	2000 cps : $S \bar{\alpha}$	2000 cps : α	$S \bar{\alpha}$
Additional absorption re- quired--pierced brick wall 0.40, 0.85, 0.65						
0.40 - 0.02 = 0.38						
0.85 - 0.03 = 0.82						
0.65 - 0.04 = 0.61						
2330 - 1466.66 = 863.34						
3315 - 1556.24 = 1788.76						
3315 - 1885.34 = 1429.66						
Material required:						
At 125 cps: 863.34/0.38 = 2275						
At 500 cps: 1788.76/0.82 = 2900						
At 2000 cps: 1429.66/0.61 = 2820						
Total		7995				
7995/3 = 2997	2990	0.38	1135.00	0.82	2456.00	0.61
Total			2601.66		3012.24	
			1.25		1.03	
						1525.00
						3410.34
						0.91

GENERAL CONCLUSIONS

In this thesis educational development and problems have been discussed in four main parts, i.e., (1) education in ancient India (Vedic period); (2) indigenous education in ancient India; (3) modern education in India during British rule; (4) education in India since Independence.

The character of education for India must take into account the indigenous influences that have survived and also the super-imposed culture which resulted from the 150 years of British rule. In other words, there must be retrospect before prospect.

The future pattern of education will demand judicious planning and courageous leadership if India is to take her place with nations of the world that are her peers in population and land area. Hence the future pattern of education needs more school plants and they must meet the needs of the community--not only providing space to accommodate the school population but also providing the right kind of space.

Also it was pointed out that existing schools have suffered most from rapid changes in educational pattern and technology, which in turn have changed the standards of school buildings. Presently school sites are too small to allow proper play facilities, opportunities for outdoor study, or other educational advantages. Very few schools provide proper playground and other recreational facilities, which are more important for present and future educational needs.

Most of the present Indian schools are not suited to the

contemporary curriculum and teaching methods. The approach has been to have a relatively fixed curriculum and an even more rigid schedule of classes, even though there was rapid change in our curriculum after Independence. Details of these curricula have been examined in previous sections.

The next problem of concern is how to create schools which are more pleasant, healthful, and safe for their occupants, and which fulfill their educational needs--all with minimum use of resources. Thus has come a new proposal for a school campus at Rajendranagar, Hyderabad, India, which provides educational spaces for pre-primary (child development school), elementary, and secondary schools. This proposed school campus is designed to house approximately 1,500 young people. This big campus has been scaled down for meeting the needs of the individual child for space and equipment.

A child has more to learn in the classroom today than in the past, and the environmental factors in a schoolhouse can do more to aid or handicap him than ever before. Hence all teaching places are designed as a learning laboratory. Contemporary curricula and new teaching methods have to become more diversified. The teachers now seek students' participation in planning and evaluation. Children's particular interests and needs are more emphasized here for designing teaching places. Some of the children may be working in the classroom individually on particular problems, others may be working in groups, and some may be doing individual research in a reading corner. Hence this proposed campus provides sufficient space to arrange and rearrange

groups of students to fit these varying activities, needs, and interests.

Also, the proposed school campus considers environment, climatic conditions, and use of local material for economical construction, and thus creates pleasant, healthful, and safe atmosphere.

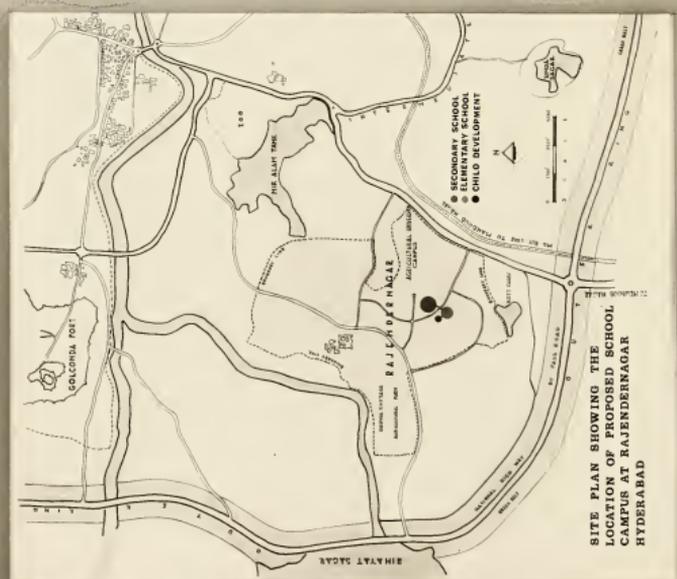
Then finally, drawings have been prepared to meet the specific program in a certain location and the architecture shaped by the educational needs. It is hoped that the architectural drawings and models will explain the activities housed, the spaces these activities require, and the relationship existing between them.

Plans, Elevations, and Sections--
Child Development School,
Elementary School, and
Secondary School

Following are drawings which show the school campus evolved from the program requirements outlined in the preceding sections. The drawings consist of architectural plans and model photographs. It is hoped that the architectural plans will explain the activities housed, the spaces these activities require, and the relationship existing between them.

EXPLANATION OF PLATE V

Site plan showing the location of proposed school
campus at Rajendernagar, Hyderabad.



PROPOSED SCHOOL CAMPUS AT HYDERABAD INDIA

EXPLANATION OF PLATE VI

Site plan showing detail of elementary and child development school and their relation to the playground, sidewalk, and main road.

Also landscaping is designed for functional relation to the site and building concept.

PLATE VI



PROPOSED ELEMENTARY AND CHILD DEVELOPMENT
SCHOOL AT HYDERABAD INDIA

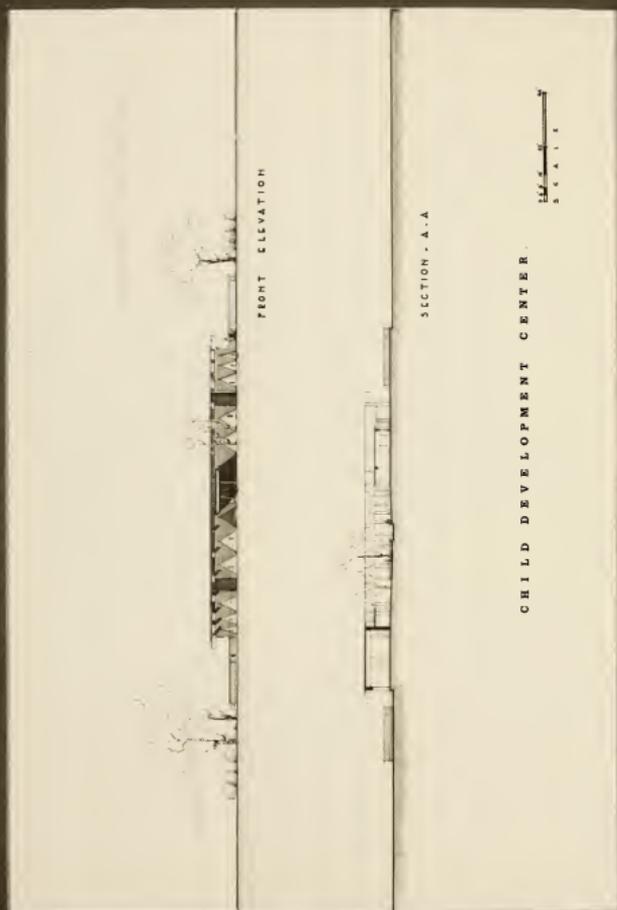
GRILLER A. E.

EXPLANATION OF PLATE VII

The drawing gives a detail plan of a
child development school.

EXPLANATION OF PLATE VIII

The drawing Gives an elevation and section of
the child development school.

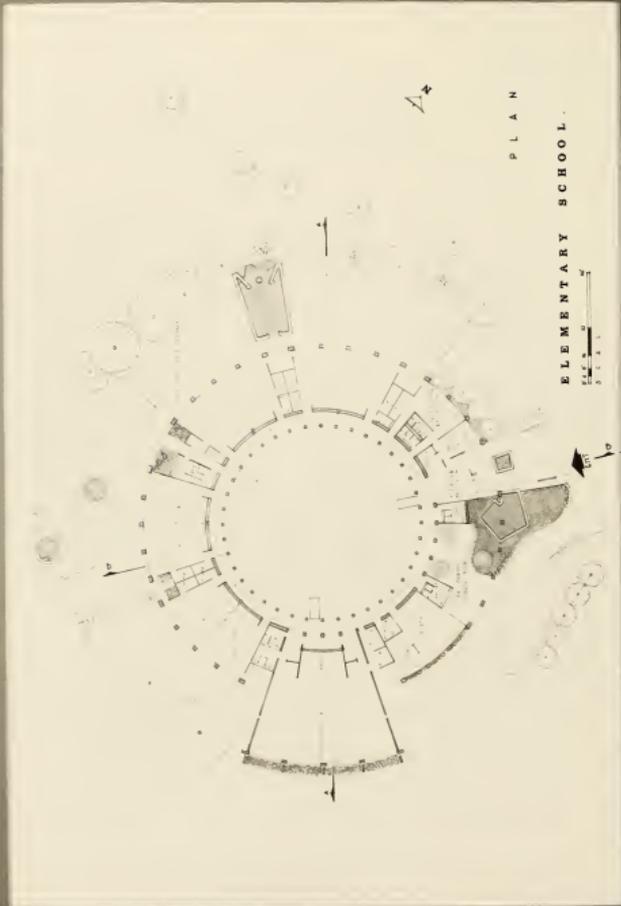


DESIGN FOR THE PROPOSED ELEMENTARY AND
CHILD DEVELOPMENT SCHOOL AT HYDERABAD, INDIA

EXPLANATION OF PLATE IX

The drawing gives a detailed plan of the elementary school.

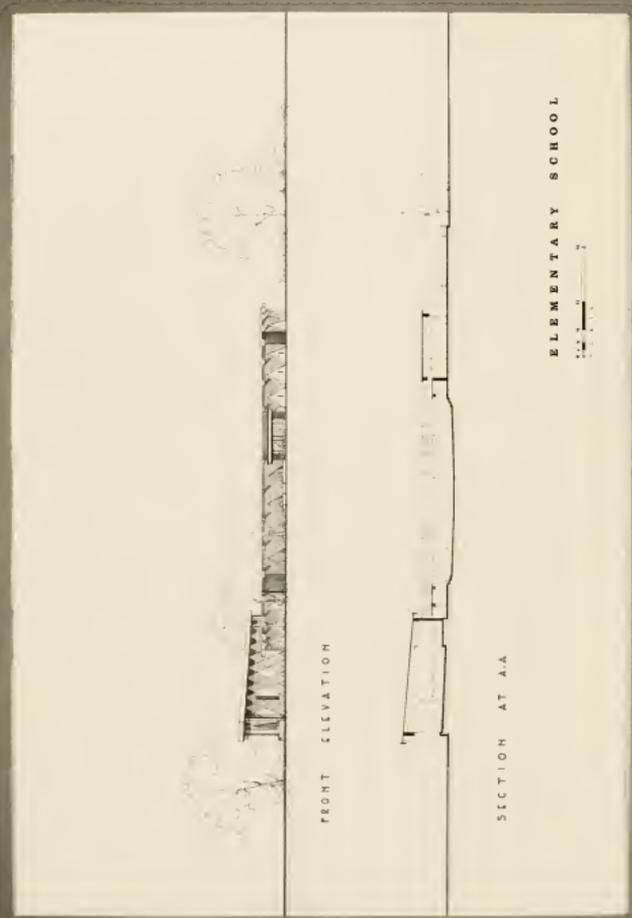
PLATE IX



DESIGN FOR THE PROPOSED ELEMENTARY AND
CHILD DEVELOPMENT SCHOOL AT HYDERABAD, INDIA

EXPLANATION OF PLATE X

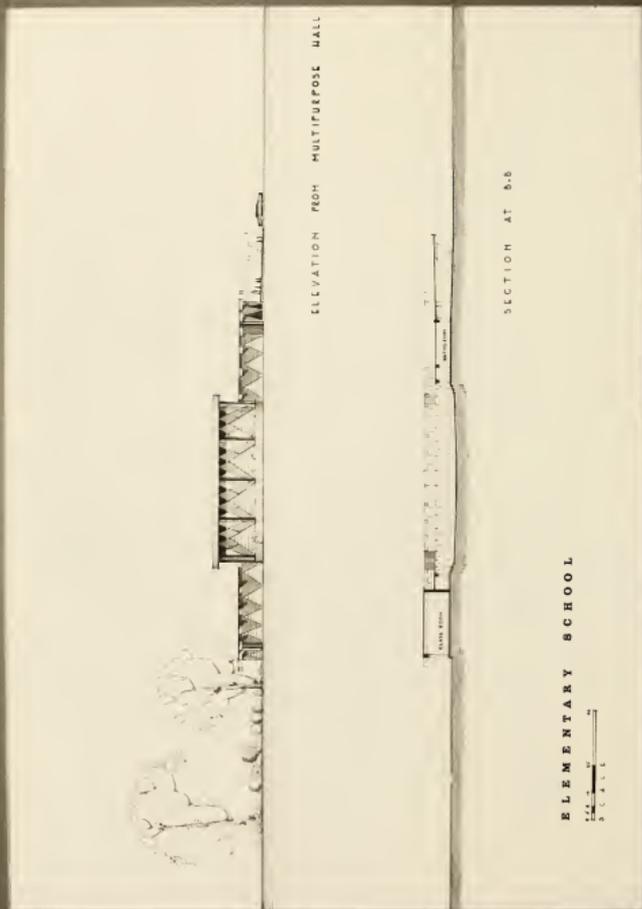
The drawing gives an elevation and section of the elementary school. Section taken through the multipurpose hall and classroom unit.



DESIGN FOR THE PROPOSED ELEMENTARY AND
CHILD DEVELOPMENT SCHOOL AT HYDERABAD, INDIA

EXPLANATION OF PLATE XI

The drawing gives side elevation and a section
of the elementary school.

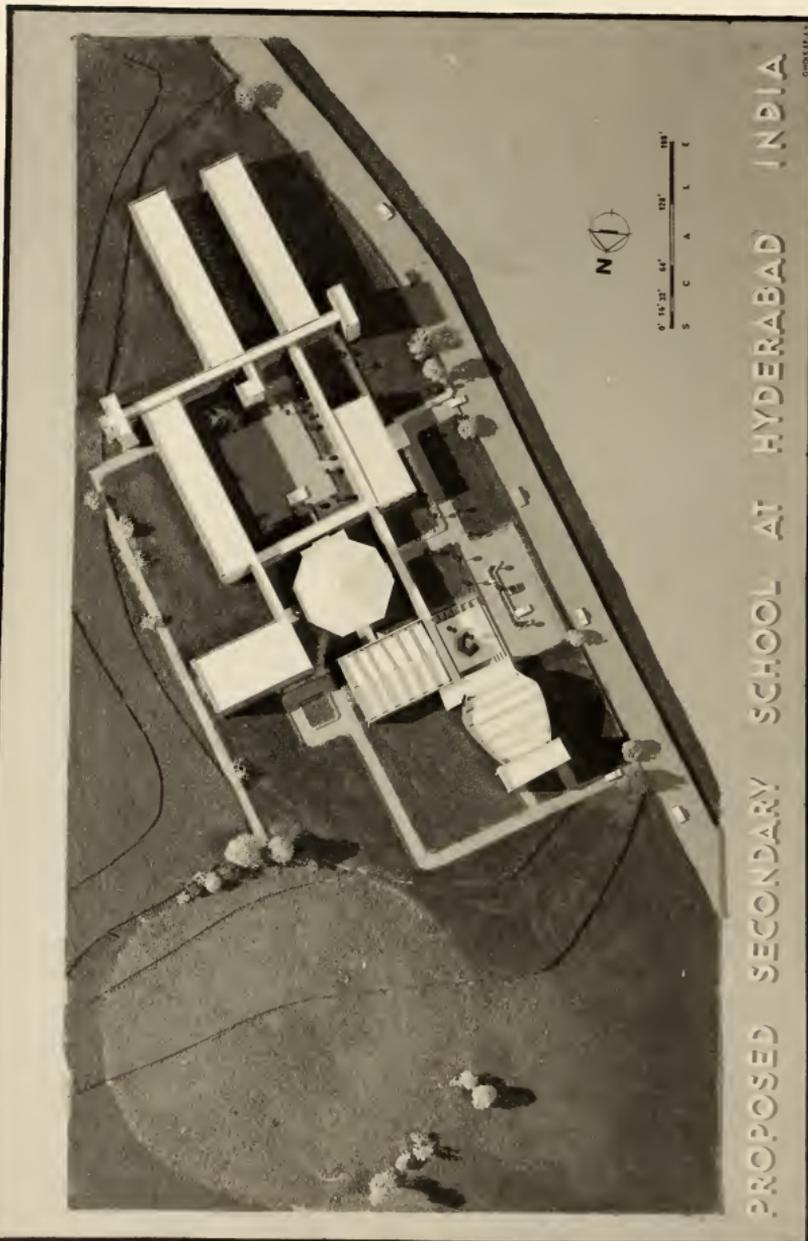


DESIGN FOR THE PROPOSED ELEMENTARY AND CHILD DEVELOPMENT SCHOOL AT HYDERABAD, INDIA

EXPLANATION OF PLATE XII

The drawing gives the site plan of the secondary school at Rajendranagar, Hyderabad, India, and its relation to the playground and other recreational areas.

PLATE XII

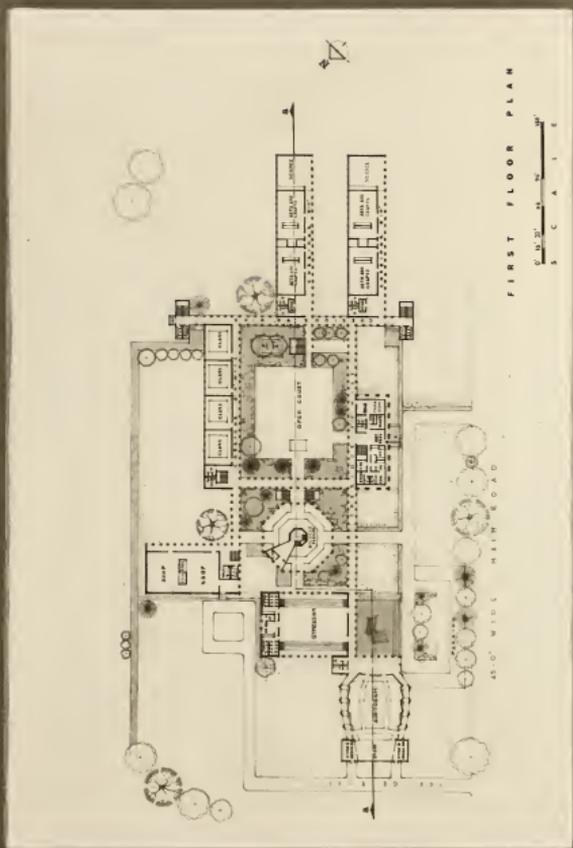


PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

© 1924, J. B. BAKER

EXPLANATION OF PLATE XIII

The drawing gives the first floor plan of the secondary school at Rajendranagar, Hyderabad, India, and its relation to the other outdoor spaces.

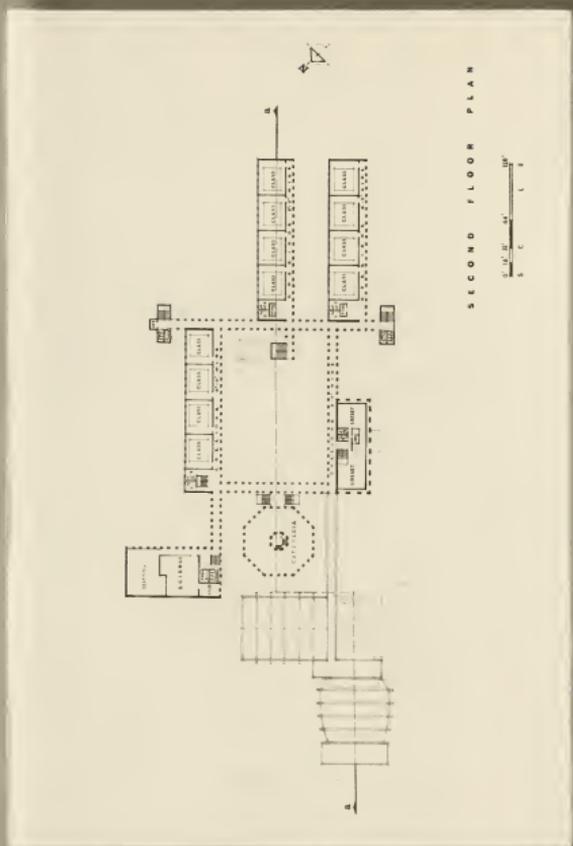


FIRST FLOOR PLAN

PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

EXPLANATION OF PLATE XIV

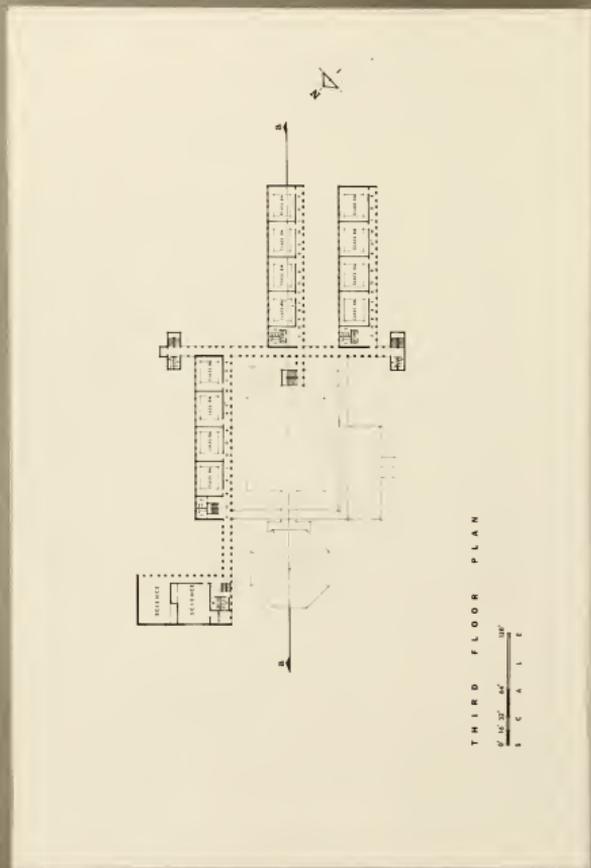
The drawing gives the second floor plan for the secondary school at Rajendranagar, Hyderabad, India.



PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

EXPLANATION OF PLATE XV

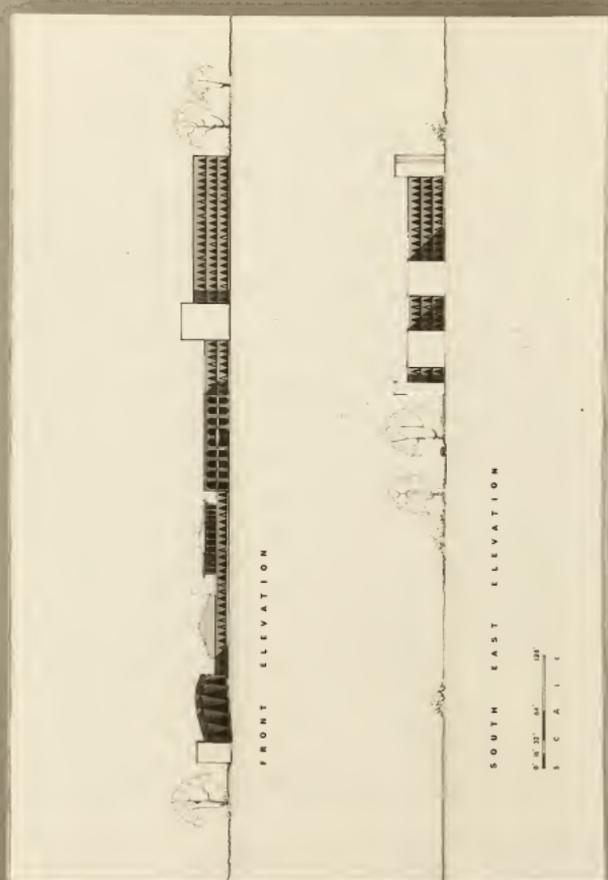
The drawing gives the third floor plan of the secondary school at Rajendranagar, Hyderabad, India.



PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

EXPLANATION OF PLATE XVI

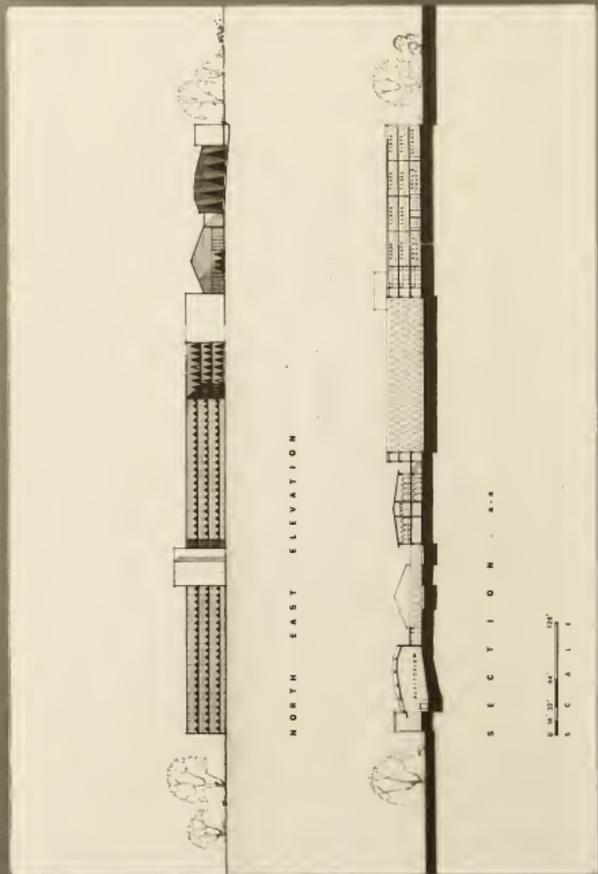
The drawing gives details of front and south-east elevations of the proposed secondary school at Rajendrenagar, Hyderabad, India.



PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

EXPLANATION OF PLATE XVII

The drawing gives detail of northeast elevation and cross section through auditorium, cafeteria, and classroom wings of the proposed secondary school at Rajendranagar, Hyderabad, India.

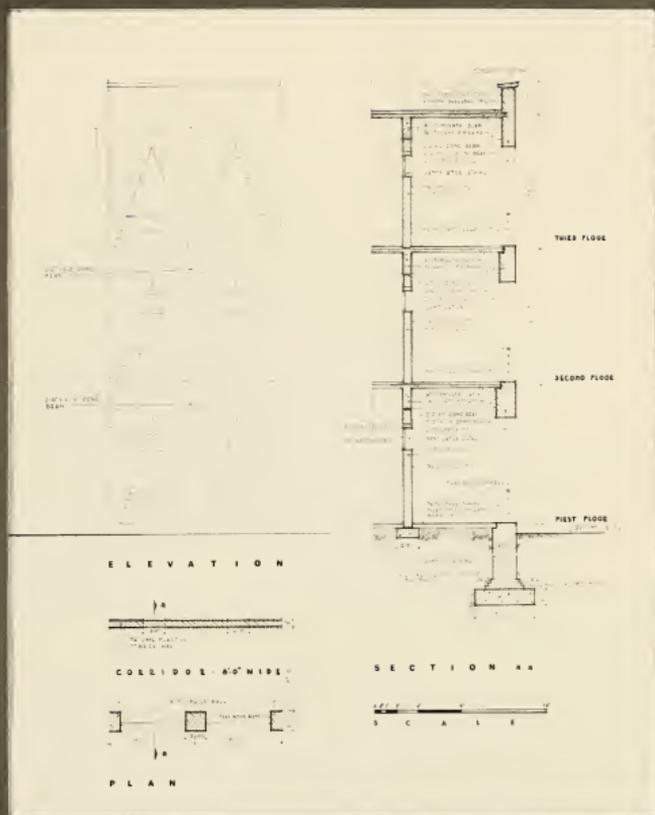


PROPOSED SECONDARY SCHOOL AT HYDERABAD INDIA

EXPLANATION OF PLATE XVIII

This drawing gives details of wall construction
for the proposed secondary school at Rajendranagar,
Hyderabad, India.

PLATE XVIII



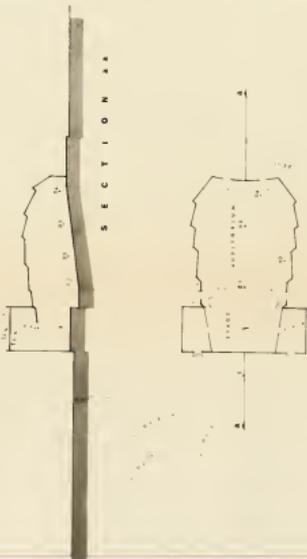
PROPOSED SECONDARY SCHOOL

AT HYDERABAD INDIA

EXPLANATION OF PLATE XIX

The drawing gives acoustic details for the auditorium for the proposed secondary school at Rajendranagar, Hyderabad, India.

A C O U S T I C



FILE 572
 DRAWING NO. 572/1-74
 ESTIMATE NO. 616 WITH 273
 20.11.57

P L A N
 A U D I T O R I U M

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	ESTIMATED COST
1	CONCRETE WORK	1000	CUM	100000
2	BRICKWORK	10000	SQ. FT.	100000
3	ROOFING	1000	SQ. FT.	100000
4	PAINTING	1000	SQ. FT.	100000
5	PLASTER	1000	SQ. FT.	100000
6	SCAFFOLDING	1000	SQ. FT.	100000
7	LABOUR	1000	MAN-DAY	100000
8	CONCRETE	1000	CUM	100000
9	BRICKS	10000	NO.	100000
10	ROOFING	1000	SQ. FT.	100000
11	PAINTING	1000	SQ. FT.	100000
12	PLASTER	1000	SQ. FT.	100000
13	SCAFFOLDING	1000	SQ. FT.	100000
14	LABOUR	1000	MAN-DAY	100000
15	CONCRETE	1000	CUM	100000
16	BRICKS	10000	NO.	100000
17	ROOFING	1000	SQ. FT.	100000
18	PAINTING	1000	SQ. FT.	100000
19	PLASTER	1000	SQ. FT.	100000
20	SCAFFOLDING	1000	SQ. FT.	100000
21	LABOUR	1000	MAN-DAY	100000
22	CONCRETE	1000	CUM	100000
23	BRICKS	10000	NO.	100000
24	ROOFING	1000	SQ. FT.	100000
25	PAINTING	1000	SQ. FT.	100000
26	PLASTER	1000	SQ. FT.	100000
27	SCAFFOLDING	1000	SQ. FT.	100000
28	LABOUR	1000	MAN-DAY	100000
29	CONCRETE	1000	CUM	100000
30	BRICKS	10000	NO.	100000
31	ROOFING	1000	SQ. FT.	100000
32	PAINTING	1000	SQ. FT.	100000
33	PLASTER	1000	SQ. FT.	100000
34	SCAFFOLDING	1000	SQ. FT.	100000
35	LABOUR	1000	MAN-DAY	100000
36	CONCRETE	1000	CUM	100000
37	BRICKS	10000	NO.	100000
38	ROOFING	1000	SQ. FT.	100000
39	PAINTING	1000	SQ. FT.	100000
40	PLASTER	1000	SQ. FT.	100000
41	SCAFFOLDING	1000	SQ. FT.	100000
42	LABOUR	1000	MAN-DAY	100000
43	CONCRETE	1000	CUM	100000
44	BRICKS	10000	NO.	100000
45	ROOFING	1000	SQ. FT.	100000
46	PAINTING	1000	SQ. FT.	100000
47	PLASTER	1000	SQ. FT.	100000
48	SCAFFOLDING	1000	SQ. FT.	100000
49	LABOUR	1000	MAN-DAY	100000
50	CONCRETE	1000	CUM	100000
51	BRICKS	10000	NO.	100000
52	ROOFING	1000	SQ. FT.	100000
53	PAINTING	1000	SQ. FT.	100000
54	PLASTER	1000	SQ. FT.	100000
55	SCAFFOLDING	1000	SQ. FT.	100000
56	LABOUR	1000	MAN-DAY	100000
57	CONCRETE	1000	CUM	100000
58	BRICKS	10000	NO.	100000
59	ROOFING	1000	SQ. FT.	100000
60	PAINTING	1000	SQ. FT.	100000
61	PLASTER	1000	SQ. FT.	100000
62	SCAFFOLDING	1000	SQ. FT.	100000
63	LABOUR	1000	MAN-DAY	100000
64	CONCRETE	1000	CUM	100000
65	BRICKS	10000	NO.	100000
66	ROOFING	1000	SQ. FT.	100000
67	PAINTING	1000	SQ. FT.	100000
68	PLASTER	1000	SQ. FT.	100000
69	SCAFFOLDING	1000	SQ. FT.	100000
70	LABOUR	1000	MAN-DAY	100000
71	CONCRETE	1000	CUM	100000
72	BRICKS	10000	NO.	100000
73	ROOFING	1000	SQ. FT.	100000
74	PAINTING	1000	SQ. FT.	100000
75	PLASTER	1000	SQ. FT.	100000
76	SCAFFOLDING	1000	SQ. FT.	100000
77	LABOUR	1000	MAN-DAY	100000
78	CONCRETE	1000	CUM	100000
79	BRICKS	10000	NO.	100000
80	ROOFING	1000	SQ. FT.	100000
81	PAINTING	1000	SQ. FT.	100000
82	PLASTER	1000	SQ. FT.	100000
83	SCAFFOLDING	1000	SQ. FT.	100000
84	LABOUR	1000	MAN-DAY	100000
85	CONCRETE	1000	CUM	100000
86	BRICKS	10000	NO.	100000
87	ROOFING	1000	SQ. FT.	100000
88	PAINTING	1000	SQ. FT.	100000
89	PLASTER	1000	SQ. FT.	100000
90	SCAFFOLDING	1000	SQ. FT.	100000
91	LABOUR	1000	MAN-DAY	100000
92	CONCRETE	1000	CUM	100000
93	BRICKS	10000	NO.	100000
94	ROOFING	1000	SQ. FT.	100000
95	PAINTING	1000	SQ. FT.	100000
96	PLASTER	1000	SQ. FT.	100000
97	SCAFFOLDING	1000	SQ. FT.	100000
98	LABOUR	1000	MAN-DAY	100000
99	CONCRETE	1000	CUM	100000
100	BRICKS	10000	NO.	100000



EXPLANATION OF PLATE XX

Site plan showing detail of elementary
and child development school at Rajendranagar,
Hyderabad, India.

PLATE XX



EXPLANATION OF PLATE XXI

Detail of elementary school units and their relation to the main central court, outdoor classes, and play area for the elementary and child development school at Rajendranagar, Hyderabad, India.

PLATE XXI



EXPLANATION OF PLATE XXII

Detail of child development school units and their relation to the main central recreational area and outdoor play area for the elementary and child development school at Rajendranagar, Hyderabad, India.

PLATE XXII



EXPLANATION OF PLATE XXIII

Bird's eye view of the child development school proposed for Rajendranagar, Hyderabad, India.

PLATE XXIII



EXPLANATION OF PLATE XXIV

Bird's eye view of the elementary school
proposed for Rajendranagar, Hyderabad, India.

PLATE XXIV



ACKNOWLEDGMENTS

The author would like to express his sincere thanks to his major advisor Professor Theodore A. Chadwick, College of Architecture and Design. This thesis, together with the designs, was prepared under his able guidance and supervision. Thanks are also due to Dr. O. K. O'Fallon, Professor of Education, who gave valuable suggestions on school planning. Also the author wishes to thank Dean Emil C. Fischer and Professor Charles E. Parks for their advice and criticism.

BIBLIOGRAPHY

- American Association of School Administration. Planning America's School Buildings. Washington, D.C.: A.A.S.A., 1960.
- Basu, Anathnath. Education in Modern India.
- Burris, Meyer, and Lewis. Acoustics for Architects. New York: Reinhold Publishing Corporation, 1957.
- Caudill, W. W. Space for Teaching. Texas Engineering Experiment Station, 1941.
- Englehard, H. L., H. L. Englehard, Jr., and L. Stanton. Planning Secondary School Buildings. New York: Reinhold Publishing Corporation, 1949.
- Handler, Benjamin. Economic Planning for Better Schools. Ann Arbor: A Department of Architecture Research Publication, College of Architecture and Design, 1960.
- Harrison, Wallace Kirkman. School Buildings of Today and Tomorrow. New York: Architectural Book Publishing Co., Inc., 1931.
- Kellog, Roda. Nursery School Guide. Boston: Houghton Mifflin Company, 1949.
- Ledesert, Margaret. India--The Country and Its Traditions. London, Toronto, Wellington, Sydney: George G. Harrap and Co., Ltd., 1962, pages 1-70, 119-200.
- MacConnell, James D. Planning for School Buildings. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1957.
- Ministry of Information and Broadcasting. India, 1963.
- Mukerji, D. S. H. Education in India Today and Tomorrow. Rao Pura, Baroda, India: Acharya Book Depot, 1960.
- Naik, J. P. and Syed Nurullah. A Student's History of Education in India. Bombay, Calcutta, Madras, London: Macmillan and Co., Limited, 1962.
- Perkins, Lawrence B. and Walter D. Cocking. Schools Progressive Architecture Library, Reinhold Publishing Corporation. 1949.

- Perkins, Lawrence B. *Work Place for Learning*. New York: Reinhold Publishing Corporation.
- Rawlinson, H. G. *India--Lands and the Peoples*. London: Adam and Charles Black, 1955.
- Stillman, C. G. *The Modern School*. London Architectural Press, 1949.
- Tagore, Rabindranath. *Towards Universal Man*. Asia Publishing Co., House, 1961.
- Waechter, H. H. *Schools for the Very Young*. F. W. Dodge Corporation, 1951.
- Zellner, Dr. *Education in India*. New York: Bookman Associates, 1951.

SCHOOL PLANNING FOR INDIA

by

ARUNKUMAR KASHINATH GHOLKAR

B. Arch., M. S., University of Baroda, India, 1963

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

MASTER OF ARCHITECTURE

Department of Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1966

India achieved her freedom from Britain in 1947 and established a secular, democratic republic. She is anxious to reap the fruits of this freedom in social, economic, and cultural terms and provide the basic elements of "good life" for the common man within the context of a socialistic pattern of society. For this purpose, co-ordinated plans of economic, agricultural, and industrial development are being implemented, through which resources may be generated for developing education, culture, and social service more fully than is the case at present. Hence it seems clear that education in India must first be used as an instrument to provide a common base of human experience for her vast range of peoples. There is serious need for a creative educational pattern that will provide a real basis for unity.

In this thesis educational problems have been discussed in four main parts, i.e., (1) education in ancient India (Vedic period), (2) indigenous education in ancient India, (3) modern education in India during British rule, and (4) education in India since Independence. The character of education for India must take into account the indigenous influences that have survived, and also the superimposed culture which resulted from the 150 years of British rule. In other words, there must be retrospect before prospect.

The future pattern of education will demand judicious planning and courageous leadership if India is to take her place with the nations of the world that are her peers in population and land area. Hence the future pattern of education needs more

school plants and they must meet the needs of the community-- not only providing space to accommodate the school population but also providing the right kind of space.

So a design for a school campus at Rajendranagar, Hyderabad, India, has been developed. This school campus provides educational spaces for pre-primary (child development), elementary, and secondary schools. This proposed school campus is designed to house approximately 1,500 young people. This big campus design has been scaled down for meeting the needs of the individual child for space and equipment. Also the proposed school campus considered environment, climatic conditions, and use of local material for economical construction. Thus a new prototype proposal has been developed which it is believed will create a healthy and safe atmosphere, and provide an answer to today's and tomorrow's educational needs.

