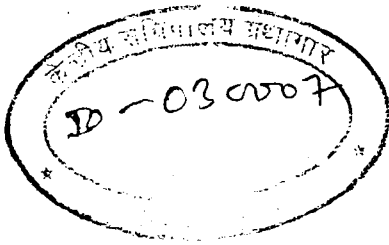


# PLANNING SCHOOLS FOR INDIA



**MINISTRY OF EDUCATION**  
**GOVT. OF INDIA**  
**NEW DELHI**



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## FOREWORD

The provision of adequate but simple housing for our schools is one of the most pressing educational problems facing the country today. A good many of our schools have been and are being designed without paying attention to the new teaching techniques, the community needs, the multiple use of space, or the various possible economies that could be reasonably effected. This problem is further complicated by the increase in school-going population on the one hand and the expanding educational programmes on the other. The present report makes a useful contribution to the study of this problem and discusses not so much what can be ideally envisaged in school construction as what is really feasible. It also gives a number of model plans with a view to giving useful ideas to the educational and other authorities for developing good and suitable school buildings designed with functional efficiency. This report, it is hoped, will lead to a re-thinking about the problem in view of the fact that the suggestions, which have been offered, have been made on 'general consensus of opinion and not on many objective studies'.

I would like to express my appreciation and thanks to all those who were associated with this project at the Centre as well as those who participated in the various seminars and contributed materially towards the compilation of this report. We are also grateful to the Technical Cooperation Mission for giving us the services of an Expert in this field for two years and some books and materials pertaining to the planning of schools. Sets of about 70 useful books have also been supplied to each State Government which should form a useful nucleus for the setting up of a library on "School Planning" at the State level.

I hope that, as a result of this project, our schools in future will be somewhat more *functional* than they have been in the past; will be more economically constructed and help children and teachers to enjoy their work better. But this is a problem which requires a great deal of further thinking and experimentation both by educationists and architects and it is my earnest desire that this brochure may stimulate the process all over the country.

K. G. Saiyidain  
Educational Adviser to the  
Government of India

## PREFACE

This report on "Planning Schools for India" is the joint outcome of a team set up at the Centre by the Ministry of Education. The team consisted of a T.C.M. Expert, an Officer of the Ministry of Education and a Senior Architect from the Central P.W.D. This team made a study of the existing literature on school designing, elicited the present status of school buildings in this country and organized five regional seminars with a view to co-ordinating ideas, experiences and practices of all those concerned with schools—educationists, administrators, architects and engineers.

A study of the literature on school planning and designing reveals that it has, more or less, followed conventional patterns in the past. It has centred mostly round the size of site, the size of classroom and the shape of the school—E, L and U being the favourites of the school planners. Architecturally, emphasis was on monumental and grand type of structures. Very little attention was paid to the physical environment. In many cases, school buildings were built to show off from some important road, with very little regard to orientation, inner circulation, safety of children, light and ventilation.

This pattern of approach was perhaps appropriate when education had a narrow interpretation being confused with teaching and the techniques employed were confined to sitting and learning. Present day techniques, however, emphasising the activity methods and school-community-relationship call for a fresh approach to the designing of schools and this presents a challenge not only to the best thinking on the part of educators, but also on the part of architects. With change in teaching methods, corresponding change in architectural expression has become inevitable. Structures that would last for ever are educationally obsolete. Thus, new innovations in structures and architectural expression have become necessary, keeping, of course, importance of economy in mind. Multiple use of every square foot of space has become so vital to the over-all economy of school buildings that all concerned shall have to see that no unused spaces are any more provided in the future plans of schools.

Consequently, this new approach envisages a close and constant cooperation between the architects and educators who should sit together, think together and plan together. Each of these experts should, moreover, learn to understand the problems of the others, appreciate the difficulties facing them and suggest ways and means of solving these problems. It is this cooperative type of planning which will lead to evolving designs in terms of activity needs of the children and community and provide schools which are both functional and economical.

The suggestions made in this report and the approach suggested, we hope, will offer systematic guidance to teachers, administrators, architects, engineers and others and assist them in designing functional schools that will meet the demands of increasing enrolment and expanding programme of education.

F. P. SCHROETER

D. I. LALL

M. M. RANA

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## CHAPTER I

### THE PROBLEM

*How great is our need for more schools? Can it possibly be met? How important is education to the success of the Five-year plans? Is "bookish" teaching adequate to cope with the problems of a rapidly changing world? How important is the classroom environment to the teacher and the learner? What kinds of schools will facilitate learning the most? Who should plan them? What priority system should be adopted to "stretch" the available education funds to yield the greatest good? How can proper utilization of space and equipment be achieved? To what extent must the school also serve the needs of the community? How can we plan for the present in terms of the future?*

These are only a few of the many questions that must be answered if we mean to provide education for all as provided in the Constitution, to improve its quality so as to be in line with the present demands, and to do it all within the very limited funds available for this purpose for the present.

Let us consider the above questions very briefly as answers to these questions will determine the kind of schools that should be built.

#### 1. How great is our need for more schools?

In a recent publication<sup>1</sup> of the Ministry of Education, "Schools for All", the following is stated:—

"The total number of children in the age-group 6-14 is more than 7.3 crores. Out of these, a little over 3 crores were actually at school at the end of the First Five-Year Plan *i.e.* on 31st March, 1956. If we break up the age-group 6-14 into two parts, 6-11 and 11-14, conditions for the latter age-group present a depressing state of affairs. Out of 4.8 crores children of the age-group 6-11, as many as 2.5 crores were at school on 1st April, 1956, whereas out of 2.5 crores children of age-group 11-14, only 50 lakhs were receiving education.

"In other words, it means that in order to extend educational facilities to all the children of age-group 6-11, we have to provide an additional school-place for every place that exists today; whereas in case of the age-group 11-14, four additional school-places have to be provided for every place in existence. What a stupendous problem!"

<sup>1</sup> *Schools for All*: Ministry of Education : 1958.



## 2. Can this problem be met ?

As stated above, we require accommodation for about 40 million children to fulfil the directive of the Constitution. Will the economy of the country support a school construction programme of a million classrooms? In terms of present practices of school construction and current costs, the answer must be that sufficient funds cannot be made available. This does not mean that it is a hopeless situation; it only means that new ways to deal with this problem will have to be found. Even if funds could be found to build a million classrooms, would we want to duplicate the present schools that are so costly and yet provide a completely inadequate environment for good teaching?

## 3. How important is education to the success of the Five-Year Plan ?

Our Prime Minister recently stated : "I feel more and more that we cannot proceed at the slow and inadequate pace at which we have been moving (in education). We have to speed it up. In the old days education was considered chiefly as an avenue to employment in Government offices. That approach continues. In addition certain cultural development is considered necessary. That is also right. But in the problems we face today, industrial or agricultural, or other, it has become patent that some measure of education is essential for progress.

"Everyone recognises this for technical work. And so, we are paying much more attention now to Technical education. But even for the vast field of agriculture, education is necessary. This is not merely to show a certain measure of literacy but to improve the farmer and the agriculturist and make him capable of utilising the new methods available to him today. Agriculture has improved greatly in Europe because the farmer is educated.

"How then can we spread education, both in quantity and quality, so as to reach our vast rural population as well as others?"

This brings out in a most succinct and pointed manner the need of education for the success of the Plans and there is no denying the fact that the future of the country itself hinges on the success of these Plans. The importance of education, therefore, for the development and progress of our country cannot be overemphasised.

## 4. Is "bookish" education adequate to cope with the problems of this rapidly changing world ?

Dr. K. L. Shrimali, Union Minister of Education, in a recent radio talk said, "The aim of democracy is the development of the individual. A democratic society cannot function effectively as long as it allows millions of its children to remain without schooling and majority of people illiterate. Freedom of speech, assembly and worship as also the power to vote and to determine the policies of a country which are considered basic in a democratic society become

meaningless when people fail to understand the conditions under which they live and the problems which confront them.”<sup>1</sup>

This naturally implies a great change in the methods and matter of education. The type of education which was acceptable to us a few years back does not meet our needs today. The education which a democracy requires is not the inert and mechanical type of education but a type of education that is active and creative. It has not to concern itself with the imparting of facts and the learning of skills; but it has to be concerned with “life” and “living”.

Consequently, the emphasis on bookishness has to decrease and that on activity and creation has correspondingly to increase. This trend is not peculiar to us alone; it is discernible in other progressive countries also. A recent bulletin of the U.K. Ministry of Education on School Planning<sup>2</sup> states the problem this way :

“The school is no longer merely an institution for compulsory instructions. The schools whose first intention was to teach children how to read now are compelled to broaden their aims until it might be said that they must have to teach children how to live.

“The school house of today is a place for many kinds of learning. It is not the traditional ‘academic hall’ designed for mental learning alone but for a programme of well-rounded growth in all phases of development—physical, social, emotional, moral as well as mental.”

Mahatma Gandhi’s philosophy of education advocated such broad aims and they are embodied in the scheme of Basic Education which has been accepted as the national pattern of education for our country. In this connection, Dr. K. L. Shrimali, Union Minister of Education, observed as follows :—

“After a great deal of discussion we have been able to evolve a national pattern of education which will suit our genius and culture and at the same time take into account the changing needs of our society. During the next five years our main task will be to re-orient our educational system in such a way that an easy and smooth transformation may take place from an individualistic to a cooperative collective society and our youth may learn to adapt themselves to the changes which are being brought about by Technological Developments.”<sup>3</sup>

Our leading educators agree with such broad aims and objectives and approve of activity type teaching. But in the planning of new schools this philosophy is usually ignored and costly new schools are being built that lack completely the flexibility to adapt to activity type and life-related teaching.

<sup>11</sup> *Radio Talk* broadcast from A.I.R. on August 15, 1956, on “Problems of Education in India.”

<sup>22</sup> *Building Bulletin No. 1* Ministry of Education, U.K.; p. 2.

<sup>33</sup> *Radio Talk* broadcast from A.I.R. on November 23, 1955, on “National Pattern of Education” in the series “Broad Outlines of the Second Five-Year Plan.”

### 5. How important is the classroom environment to the teacher and the learner ?

Everything in the world is changing very rapidly. Schools, more than all other institutions, must change to prepare youth for its proper place in the new age—the curriculum must change and so must the methods.

The school environment, in fact, has become an all-important part of education. Every detail of the school, it has been recognised, will have its effect on the children and everything that goes on in it will contribute to their education.

Since education results through the interaction of the learner with his environment, the importance of creating an environment that facilitates the kind of educational programme to which the school system is committed cannot be overemphasized. The classroom climate has a tremendous effect upon the personality development and the learning of the children. Teachers often find themselves handicapped in achieving their objectives by the limitations of their classroom environment.

A school that is built for learning is planned with consideration for the highly individual ways in which children learn. The myriad avenues that children travel and myriad goals they wish to reach require learning opportunities of many sorts. Only as educators recognize the diverse potentialities of children will they plan ways by which pupils' potentialities may be realized. These ways cannot be haphazard or incidental, but must be planned opportunities for learning in the light of what is now known about how children learn.

### 6. What kinds of schools will facilitate learning the most ?

The first thing that children want to learn is about their physical environment. The wonder and diversity of physical things stimulate them to learn. As indicated by their incessantly asking "why", very young children begin to think about physical occurrences in terms of causes.

Youngsters think about weather, electricity and power, stars, planets, simple elements of chemistry and physics, changes of the seasons and so on. They usually are eager to read about these things in simple stories or to hear about them.

But they want to go one step further: they prefer to handle, manipulate, and have direct personal contact with the physical world—to touch, feel and smell it. The feeling-touching-smelling aspect continues to help children build the sense of becoming a part of their physical world. Good schools make provisions for children to have sensory experiences.

Children have difficulty in comprehending abstract concepts presented by means of verbal symbols. Through the use of audio-visual learning materials, children can more easily understand such

concepts. Good school design and equipment provide for the easy and effective use of all kinds of objective learning materials. A child needs to develop a feeling of self-sufficiency, adequacy, and independence. In order to achieve these ends he should have many opportunities to develop an image of himself as a person who is growing, who is responsible and helpful, who is able to do things deemed important by his peers and by the society he lives in.

Interest is another important requirement of learning. To interest any group of children requires a diversity of opportunities and facilities so that curiosity of each child is aroused. Such facilities should, therefore, be provided as will stimulate their interests. The school building and the nature and extent of facilities available can provide for or limit children's interests to a large extent.

A child also needs to have something to care for—something for which he is responsible. Because a sense of ownership develops responsibility toward property, each child should have his own storage space for things that belong to him.

Children have also to learn to work and play with others in both large and small groups. Each child must have experience in being a leader, a follower, and an observer of groups if he is to become adequate in each of these roles.

Children need beauty in their lives. But if the beauty is too fragile or too remote from the children's experience, it may have a negative effect. Landscaping should allow children to be near trees and flowers—to plant them, to play with them and dance on the lawn.

## 7. Who should plan our schools?

Every person should be involved who can contribute to making the new school building best serve its pupils through the educational programme. The competent architect values the participation in school planning by educators who understand and believe in the objectives of the school programme. School buildings are never built for the past or even for the present. They must be planned and built for the future. Planners of schools must be thoroughly informed on the trends in education because trends reveal in part the future. This is not an easy or simple task. Education develops and changes as we learn more about human beings—about how they learn, why they behave as they do, and what is best for their health and physical growth. School buildings must be planned with a clear recognition of the desirable changes in education which would result from this greater knowledge of the learner, and how these changes should affect the building facilities provided.

The expanded knowledge of individual differences and the growth in the knowledge of how children learn and under what conditions and in what sorts of environments children learn best, have led to a greatly changed classroom. No longer is it good educa-

tional practice to require a child in the primary school to sit all day in one place to work out his limited textbook assignments in immobility and silence. It has been discovered that he learns best when he works in a classroom designed as a laboratory for purposeful group planning, individual study and research, discussion and class evaluation. The new classrooms are, therefore, provided with a variety of equipment for study and meaningful activity and with close correlation of indoor and outdoor teaching space. The aim of cooperative planning of educators and architects is to develop educational goals and specifications which will stimulate rather than stifle the creative ability of the architect. The supreme consideration transcending all others in planning a school building is the educational programme to be housed. Decision pertaining to exterior design, choice of building material and equipment, site selection and integration with the building, and grouping and relating instructional and service facilities within the building can be intelligently made only in terms of educational programme and service needs. Unless this simple yet essential approach to school planning is accepted, it is highly probable that the physical plant will not only hinder but also defeat the school and community programme instead of promoting it. A school building must be designed from the inside out instead of from the outside in.

The most practical way of achieving this end is to increase the cooperation between the educators and the architects. Educators should advise the architect as to what activities will be carried on in a given area, and how many people are to be served, besides making general suggestions about location, shape and dimensions. They should, however, leave it to the judgment of the architect to plan the building to meet these specifications. The architects should implement the educational plan with functional, economical and aesthetic considerations. It is uneconomical, for instance, to build a school which does not meet the needs of a sound educational programme. Similarly, cheapness should never be confused with economy; although cheapness may receive acclaim, it is short-lived and never pays off. If the architects are briefed properly, our schools will be much more functional than they have ever been in the past.

8. What priority system should be adopted to "stretch" the available education funds to yield the greatest good?

The Prime Minister in a recent communication stated: "How then can we spread education, both in quantity and quality, so as to reach our vast rural population as well as others? Let us take primary education which must necessarily be the base. We hold it up because of lack of money and lack of teachers especially for basic education. Probably we still spend much more money on buildings than on equipment or teachers. Can we not stop putting up any buildings in rural areas and devote the money thus saved to a better class of teachers as well as to some equipment? The

equipment would have to be kept somewhere and there should be a small room or hall for that purpose. But all the teaching might well be done in the open under trees or under very simple sheds.

"It must be remembered that our climate helps and normally it is healthier to sit outside under a tree or in a grove, except during the rainy season. Also, our old traditions fit in with this open air teaching.

"It seems to me more important to have a proper house for the teacher than to put up a building for the school. The teacher could keep the equipment and teach outside. *The school revolves round the teacher and not round the building.....* We have to change our approach to primary education. We have to make it better without buildings. Let us have our holidays during the monsoon season and for the rest, work in the open and let us pay our teacher much more."

These suggestions are very far-reaching and pressing and give us plenty of food for thought. We have to devise some such system of priorities as would enable us to enhance the status of the teacher and improve the quality of education. Investing in brick and mortar alone will not take us very far.

#### 9. How can proper utilization of space and equipment be achieved?

One of the criticisms levelled against educational buildings in this country is that they have many such spaces that have little or no functional justification. Corridors, for example, are provided for the sole purpose of circulation. Similarly, there are other rooms, the full time use of which is never made. This not only increases the cost but decreases the functional utility of the buildings also. It is, therefore, essential that all such waste of school building funds in our country should be avoided and every square foot of floor space should be designed for full time use whether it be a corridor, entry way, assembly hall, science room, library etc. The acceptance of this principle will automatically lead to better utilisation of school equipment also.

Besides the covered space, the adjacent open space must be planned as carefully for its educational use as the inside of the classroom. There are lots of things in life-related education which can be done better in the open space than inside a classroom and if such open spaces are properly planned, their utility to the teachers and the pupils will be multiplied manifold. Outdoor space could provide a much better teaching environment than the best classrooms. Furthermore, provision of such areas will reduce the amount of covered space required for our children and thus lead to economy in cost of school buildings.

#### 10. To what extent must the school also serve the needs of the community?

There is a growing realisation the world over that the school plant should be planned to provide not only for the educational

needs of the children, but also for many, if not all, of the social, civic, recreational and cultural needs of the community. This will not only avoid duplication in buildings and equipment but increase their utilisation also. Furthermore, as the school and the community draw closer together, interest in and support of the regular school programme by the community will increase accordingly.

The most important question in this connection is: What are the needs of the community which may be met by proper planning of the school? Answers to this question can only be found at the local level—in most cases the village panchayat will be the logical group to answer this question. The State Education Departments could give some advice and guidance but in the final analysis the needs should be worked out locally with the cooperation of interested citizens. But the fact that the school of the future will have to cater to the needs of the community in some measure has to be borne in mind while planning our school buildings.

In the above paragraphs we have made an attempt to answer the questions we raised at the beginning of the chapter. The most important suggestion that emerges out of them is that a school building is a means not an end—it is a background for an activity and it helps or hinders what goes on in it or around it. The perfect room or building is one which is apparent only to the extent of facilitating, to a maximum degree, the conduct of a desired activity or process.

Schools, moreover, have neither to be built for the past nor for the present—they have to be built for the future. They must, therefore, be planned keeping in view the changing trends in the aims they have to fulfil, the programmes they have to cater to, and the methods that will be followed therein. The planners must be in a position to have a peep into the future and plan accordingly.

Furthermore, all school building programmes involve large sums of public funds. Their wise and economical use is naturally a grave responsibility of the education authorities. In order to discharge this responsibility properly and wisely, schools should be planned not by the educationists alone but on a co-operative basis by educationists, architects and engineers. When this is done, the planners should apply the seven point test given below to each plan that has been drawn up and see if it passes the test:—

(i) *Curriculum Adequacy*—Does it provide the space and facilities for the educational programme that the community needs for its children?

(ii) *Interfunctional Coordination*—Is it so planned that the activity in each part of a building may be coordinated harmoniously with related activities and may be carried on effectively without disturbing other activities?

(iii) *Efficiency and Utility*—Is it so planned that the handling of materials and the coming and going of pupils, school staff, and the public are accomplished with a minimum of interference and a maximum of ease and satisfaction to all concerned?

(iv) *Adaptability*—Is it so planned that it can be enlarged or rearranged internally to meet new educational demands with a minimum of additional cost?

(v) *Safety and Well-being*—Does it not only protect against danger but also provide a positive influence for improving the health and physical welfare of the pupils?

(vi) *Beauty*—Is it pleasing in appearance, with simplicity, usefulness, and balance as ideals, rather than emphasising ornamentation, symmetry or its look from the street?

(vii) *Economy*—Is it so planned that in original outlay and in future operation the utmost in educational utility can be secured for every rupee spent?



## CHAPTER II

### PROGRESS TO-DATE

The importance of school facilities to the success of the instructional programme has been pointed out by educators at various times. The Government of India also has not only been conscious of but concerned with this problem for a long time and their concern, in the words of Shri K. G. Saiyidain, "has developed in recent years into grave anxiety".<sup>1</sup>

In fact the first organised attempt to take a note of this problem on an all-India basis was made by the Department of Education, Government of India, as early as the beginning of this century which published in 1911 a report entitled "Occasional Reports No. 6—Educational Buildings in India". This report is a collection of descriptions of buildings with illustrations and plans by various educational authorities in India and was compiled by Mr. W. H. Orange, formerly Director-General of Education in India. It not only covered schools but also training colleges, technical institutions, arts and science colleges and university buildings. This collection has plenty of variety in it and it extended from a humble primary school costing five hundred rupees to magnificent buildings of colleges and universities on the erection of which considerable sums of money were spent. A collection of the drawings and descriptions of such buildings was thought to be of much interest and use to the future planners because it would enable them to see what has been done before and then put their own ideas and requirements in the shape of plans.

In his introductory note to this report, Mr J. Begg, an Architect, praised the architectural beauty of school buildings in India but stressed the need to consult an architect prior to the planning of schools and colleges in India. The first point that he touched upon in this connection was the absence of any indication of the seating accommodation in the classrooms. He said, "In fact, to determine the exact dimensions and disposition of the furniture is the first task of the school designer before the design of the building itself is even begun. Exact information should be obtained from the educational authorities concerned as to how the various classes are to be seated—whether on long benches, with or without desks, or on simple mats on the floor; whether they are to be placed according to the simple or dual desk system; whether in a flat-floored room or on graded tiers as in lecture rooms. These are not matters which should on any account be left to be settled afterwards; unless they are taken at the initial stage, the all-important considerations of convenience and economy cannot be given full effect to."<sup>2</sup> This,

<sup>1</sup> *School Architecture*: Foreword, p. (i); Publication No. 245.

<sup>2</sup> *Ibid* : Introductory note : page (ii).

incidentally, shows the simplicity of space requirements of formal education as visualised by experts in those days.

Mr. Begg referred to the defect in lighting and accessibility of classrooms. He found that they were seldom considered with relation to the exact disposition of the class. He also deprecated the tendency to consider that "a room is just a room, whatever its purpose. There is further too much of a tendency to regard a building as a mere congeries of rooms and not as an articulate whole—an organism."<sup>1</sup> He found that the more ambitious school buildings were "usually of somewhat too ornate and grandiose a character in design. . . . It is hard to see how the multiplicity of domes, minaretes, cusped and fretted arcades and other expensive features with which the bristling exteriors of many of our scholastic buildings are covered can conduce to further the great cause of education."<sup>2</sup>

Finally, it was suggested that consideration be given to convenience and suitability with due regard for economy before any planning is done. The plan, moreover, should have an appropriate and purposeful look and the beholder should be in a position to say that he is seeing a school. A note of refinement, dignity and seriousness should be struck into the buildings. More attention, it was emphasised, should be paid to the production of good-looking interiors, and less to that of imposing exteriors. The cost of buildings would consequently be less but the educative effect greater.

This study was, therefore, a description of things as they were with some concrete suggestions for planning for the future.

The growing need for school buildings was next recognised by the Central Advisory Board of Education which stressed the importance of taking steps to ensure that school buildings should be designed keeping in view the modern scientific standards in regard to accommodation, lighting, ventilation and sanitation and with due regard to efficiency and economy. The Board recognized the fact that a certain amount of experimental work had already been done in this field in different parts of the country. In order to collate the results of these experiments as well as to consider problems that had not been tackled, the Board set up a School Buildings Committee in 1941 to prepare a report for the guidance of authorities concerned with the provision of school buildings.

This committee's report was considered by the Board in 1942 and its recommendations were adopted. The committee considered it necessary to determine the environmental conditions under which both the teachers and the students could be capable of maximum output without undue fatigue.

The committee laid down certain principles to be observed in the design and planning of school buildings. The main recommen-

<sup>1</sup> *Ibid*, page iv.

<sup>2</sup> *Ibid*, pages iv, v.

<sup>3</sup> *Report of the School Buildings Committee of the Central Advisory Board of Education in India* : Pamphlet No. 13; Bureau of Education, India : 1946.

ditions in regard to floor areas were as follows :—

|  |  |
|--|--|
| <i>Primary School</i>                    | 10 sq. ft. floor area per pupil  |
| <i>Middle and High Schools</i>           | 12 sq. ft. floor area per pupil  |
| <i>Minimum floor area of a classroom</i> | 400 sq. ft. or a little over it. It could be extended to 480 sq. ft. with advantage from the purely educational point of view. |

It also made recommendations regarding laboratories, craft rooms and other special rooms. After defining the floor area of the main types of rooms, the committee considered the minimum accommodation which ought to be provided for schools of different sizes in each of the three main stages of education *viz.*, primary schools, middle schools and high schools. For a primary school, it suggested, that each teacher should have a classroom for himself in addition to some place for assembly, school functions, physical exercises etc. The need for more space, it was suggested, could be met by providing movable partitions between classrooms. Extensive use of verandahs was also stressed—the width of a verandah being at least 8 ft. Provision of a store room and recesses in the walls of the classrooms in which almirahs could be placed was also suggested. The committee did not consider the provision of a separate hall as an essential part of the accommodation of a primary school but suggested less expensive means of providing the space required. Movable partitions were not favoured owing to their cost and climatic considerations but partitions made of bamboo or other light screens which could be easily lifted out and put back were suggested. Similar suggestions were also made for middle schools, high schools, technical institutions, and for schools for the handicapped.

With regard to furniture and equipment, the committee emphasised the need of taking special care to see that school desks and chairs are scientifically designed. It also considered the problem of squatting on floor but did not give any opinion on this point in view of the need of special investigation by a body of experts in regard to the effect of posture on a child's health and growth. The committee also stressed the fact that school buildings should always be kept in the best possible state of repair and suggested the establishment of an efficient caretaking and cleaning service.

Though the initiative in the field of school planning was taken by the Central Government, the State Governments were also doing useful work in the same direction. It would, therefore, be useful for us to recapitulate here, very briefly of course, the work done in different States and bring out the salient features in each case.

#### ANDHRA PRADESH

This State has drawn up regulations for the construction of school buildings. These regulations have to be strictly adhered to and

school buildings have to be suitably constructed, properly ventilated and well maintained. Details regarding selection of sites, orientation of buildings, provision of floor space, composition of floor, seating arrangements, provision of doors and windows, height of the classrooms, roofs, sanitary arrangements and furniture and equipment are contained in the regulations. The planning of Government school buildings is done by the Public Works Department while in the case of schools for local bodies, planning is done by their own engineers. In the case of private schools, the services of an engineer or an architect have to be obtained. The Education Department also approves building sites before approving plans for their construction. In the case of Government schools, schemes are selected for execution on the basis of preferential treatment namely, preference for the construction of school building is given to those localities where the local Education and Parents Committees offer to contribute a part of the cost of school buildings.

#### **ASSAM**

In this State also, the responsibility for the construction of buildings of Government schools rests with the Public Works Department. But the plans drawn up by them have to be approved by the Education Department.

#### **BIHAR**

This State has made a notable advance in establishing a Building Research Unit at the headquarters. Prior to 1954, the Education Department of the State Government was depending mainly on the State Public Works Department for preparation of plans and estimates as well as for the execution of the various educational building projects which were to be financed from Government funds. Besides, the Department did not have any prescribed specifications or plans for different categories of school buildings.

In April 1954, the State Government set up an Educational Building Research Unit attached to the Education Directorate, Patna. Though the senior staff of this Unit is taken on loan from the Public Works Department yet it is directly under the Department of Education. The functions of the Unit are as follows :—

- (a) To examine conditions in the different regions of Bihar and to prepare type-plans for educational buildings in keeping with departmental requirements and the locally available materials and resources.
- (b) To carry on experiments in such buildings in the neighbourhood of Patna and elsewhere with the aid of local authorities.
- (c) To examine applications for buildings grants from Government which are received from time to time and were previously scrutinised by the Superintending Engineer or Executive Engineer.

- (d) To give advice to the educational institutions from time to time regarding their building problems and to review constantly the financial and technical aspects of the building programmes sponsored by the State Government.

Besides, the State Government have set plans for different types of school buildings. The Department has also brought out a printed handbook containing detailed instructions, plans and estimates for the above buildings. One of the main advantages of the Bihar-type plans is that a school building which starts on a modest scale with one room can be gradually expanded by the addition of more rooms simultaneously with the growth of the institution.

Another notable achievement of the State Government is the preparation of a Master Plan for the more important Government institutions. The needs and requirements of such institutions were examined on the spot and the ultimate picture was visualized and master plans showing additional land to be acquired and the location of the additional buildings to be put up were prepared. The position to-date is that all the Training schools of the State, most of their Post-Basic schools and Government managed High schools, have their master plans ready.

As regards specifications, the view of the State Government is that while the country cannot afford to have luxurious and expensive school buildings, at the same time it is not in the interest of the nation to sacrifice completely quality for quantity and put up buildings with very low specifications such as those used in the residential houses of an average villager in the State. Consequently, such specifications have been recommended as will ensure against damage to the structure if it is neglected for a few years. Moreover, they provide scope for the community to improve upon them gradually over a few years depending on their resources.

The estimated cost of the specifications varies between Rs. 2.50 and Rs. 3.25 per square foot depending upon the size of the building.

It is evident from the above that the Building Research Unit has done commendable work and the experiment seems to be a success.

## **BOMBAY**

After independence the Government of Bombay had a survey made of the facilities available for the schooling of children and in 1950, they published a brochure entitled "Primary School Buildings—General orders regarding their construction". As a result of the survey, it was discovered that out of a total number of 21,657 towns and villages in the State, exclusive of merged areas, 8,224 villages had no schools at all. It was also found out that even in those villages that had schools a large majority of schools had no school buildings and, in many cases, the accommodation provided was insufficient.

In order to meet the requirements of adequate school buildings in various villages, the State Government laid down priorities by which the work of construction of new primary school buildings was to be undertaken in those villages where the need of the school buildings was felt acutely. It was also laid down that buildings of reasonably adequate standards were to be built according to the priorities laid down rather than to wait till it is possible to construct good buildings in all places.

Efforts were also made to secure the fullest possible public co-operation as also that of the leading officials and non-officials and of the District Local Boards as an agency for actual execution of the work of construction of primary school buildings. With a view to achieving this end, District Building Committees of officials and non-officials were set up to organise and supervise the provision of school buildings. Public contribution was collected by the District Building Committees at the rate of 25% of the estimated cost of the proposed construction of the primary school buildings which was subsequently revised and raised to 40% from 1st April, 1956. The villages from backward areas having backward class population more than 60% of the total population of the villages were granted the concession of paying their share of contribution at the rate of 25% of the estimated cost of construction. This concession was further revised and the rate of public contribution in backward areas was reduced from 25% to 20%. Requirements regarding sites, preparation of plans and estimates, supply of materials for construction, supervisory agency and modes of financing the construction were laid down. Four different standard type plans for construction of primary school buildings were also prescribed. A special type plan for the construction of a First Grade Primary School building consisting of 12 rooms was also prescribed. In addition to this, type plans for construction of urinals and latrines, and for the construction of teachers' quarters have been prescribed by the State Government.

With a view to accelerating the building programme in the State, Building Loan Scheme was introduced in April, 1953, along with the establishment of the State Provident Fund for the staff of the District School Boards including Primary teachers. Under this Scheme, building loans are advanced to the district school boards repayable in 20 yearly equated instalments. It has also been laid down that the District Building Committees should earmark not less than 15 per cent and not more than 50 per cent of the annual grant for construction of school buildings in backward areas.

#### **KEIRALA**

The Government of Kerala has also gone ahead with its programme of school buildings. It has prepared type plans for lower primary and upper primary schools and has laid down detailed specifications for their construction. The buildings are durable and the cost of these buildings works out to between Rs. 5 and Rs. 6 per

sq. ft. The annual maintenance cost is very little as all the maintenance required is white-washing the walls, painting the doors and windows and closing leakages by replacing broken tiles. In this State where half the year round is rainy with 60" to 200" rainfall, the type of buildings that they are now constructing seems to be very cheap. All the school buildings in the State are so constructed that they can be closed and locked. This is considered to be absolutely necessary in the State where the density of population is very high and the possibility of vagrants and beggars using the school buildings as their night resting places is great.

### **MADHYA PRADESH**

The present State of Madhya Pradesh is a product of the recent States reorganisation and consists of Mahakoshal region of former Madhya Pradesh besides Bhopal, Madhya Bharat and Vindhya Pradesh. In regard to buildings for schools the practices and regulations prevalent in the different units before the reorganization are being allowed, pending unification. The planning of buildings for Government schools is done by the Public Works Department but these plans are examined and approved by the Department of Education. There were standard plans for Primary schools, Middle schools, Normal schools, etc. in Bhopal, Madhya Bharat and old Madhya Pradesh. Efforts are made to encourage voluntary contribution in cash or kind for the construction of school buildings.

### **MADRAS**

The Government of Madras has also made enough headway in this direction. It has approved cheap designs for elementary schools and has also published a small brochure entitled "Rules relating to Elementary Schools". This brochure contains rules and regulations for the construction of school buildings. The managements have to adopt the designs approved by the Education Department. Detailed instructions have also been laid down in regard to selection of sites.

According to an estimate of the Madras Government, approximately 75 per cent of the actual school-going population is provided with adequate accommodation. For the opening of district board schools in some districts, the villagers are required to provide rent-free building for the location of the school or to arrange to construct a building, the cost being met by themselves. In the case of local development work scheme, the villagers or organizations are asked to contribute one half of the cost of the scheme.

### **MYSORE**

The State of Mysore initiated in October, 1952 the Cheap Design Scheme for construction of Primary School buildings under which villagers could construct school buildings according to the plan approved by the Education Department and on completion of the building, the Government grant would be assessed and reimbursed.

The main object of the scheme was to get school buildings constructed speedily and at less cost by entrusting the construction to local bodies or private agencies who might come forward to put up classrooms measuring 20' x 15' estimated to cost Rs. 1,500 and receive Rs. 750 only as the share of the Government in full payment of the cost of the building.

This Scheme has since been revised and a new type design Scheme has been introduced. In accordance with this Scheme, type design for a single room primary school has been prepared and approved. The Government's share for construction of such buildings is Rs. 1,500 per classroom with R.C.C. roofing and Rs. 1,400 with Mangalore tiled roofing at 50% of the estimated cost of Rs. 3,000 and Rs. 2,800 per room respectively, the balance, if any, being met by local contributions and donations. The Director of Public Instruction, Mysore, is responsible for distributing the grant provided in the budget for construction of such buildings and place it at the disposal of the Deputy Commissioners who in turn draw up a programme for building works under this scheme in consultation with the District Educational Officers. After these programmes have been drawn up, the Deputy Commissioners place the sum allotted at the disposal of the Tehsildars of the Talukas in non-National Extension Service and non-Community Development Areas, and of the Block Development Officers in the case of works in the Community Development and National Extension Service Blocks.

In the districts of Dharwar, Belgaum, Bijapur and North Kanara, districts which were in the Bombay State and have now been included in the Mysore State as a result of the reorganization of States, the construction of primary school buildings is taken up by the District School Boards through the agency of the District Building Committees constituted in each district. As the resources of the District School Boards are very limited, a scheme for payment of loans to the District School Boards for construction and for special repairs to school buildings repayable within 20 years at the rate of 1% interest per annum was evolved by the erstwhile Bombay Government and this scheme is continued tentatively in these districts of the new State.

### **PUN JAB**

In this State the construction of buildings for Government schools is the responsibility of the Public Works Department. In the case of private schools, however, planning is done by private engineers and architects. The Department of Education approves the plan drawn up by the Public Works Department; it also gives advice to the private schools in case the managements of the schools make a reference to this Department. Some standard designs have been prepared by the Public Works Department for the construction of Government schools in consultation with the Department of Education. Formerly, the entire cost of construction of schools and supply of equipment was borne by the State. But now, partly



to develop local initiative and partly to interest the community in the school, the people or local panchayat are asked to construct the school building and also contribute something towards the cost of furniture and other equipment.

This State has also made an attempt towards the standardization of furniture needed in the schools. It has published an "Inventory of Furniture" containing approved sketches and specifications of furniture suitable for use in the educational institutions in the State. Twenty-nine items of furniture are illustrated with details of drawing and design. The estimated cost of these items is also given.

### **RAJASTHAN**

Plans for different types of schools—primary, middle, high and special—according to the requirements of each have been prepared in this State. Provision is made in these plans for the residential accommodation for the staff also. As in the case of most of the other States, the agency for the planning and construction of Government schools is the Public Works Department. Their plans, however, have to be approved by the Director of Education as far as possible.

To overcome the shortage of school buildings, the State Government is considering the question of providing cheap buildings. In the case of private schools, public donation of school buildings is accepted if the buildings satisfy the prescribed specifications and 50 per cent. of the estimated cost of school buildings is made available to them out of the development funds.

### **UTTAR PRADESH**

The State of U.P. was one of the pioneering States to take up the question of school buildings. In this State, as early as 1931, some type plans for primary school buildings were got prepared and were circulated for the guidance of District and Municipal Boards. These were sixteen in number but the main basic plans were two. The main difference in these plans was regarding the roof which was to suit local conditions.

In 1948, when a rapid expansion of Primary education was planned out, it was considered necessary to evolve type plans on the basis of what had been done in 1931 and to suit the changed conditions. A new type Plan was, therefore, evolved. This plan differed from the 1931 plans in the following manners :—

- (a) It gave more teaching space than 1931 Plans in which provision had also been made for the residence of teachers, store-room and kitchen. On account of rapid expansion of educational facilities and more and more intake of children in schools, it was necessary to increase the class-teaching space at the cost of other requirements. As the schools were being opened in large numbers, it was expected that most of the teachers will not need resi-

dential space in the school buildings (specially in the Plains). Moreover, if a teacher wanted to stay or some equipment was to be stored, a suitable partition in one of the side-rooms could serve the purpose.

- (b) As the cost of materials and labour had gone very high as compared to pre-war days, it was decided to reduce the cost by constructing *kutchha* walls (mud-walls). In order to give protection to the walls, a four feet outer lining of bricks from the bottom was suggested.
- (c) Not only had the cost risen higher in the post-war days but material for *pucca* buildings was also not easily available. Therefore, country tile-roof was adopted as a common pattern. Certain other modifications were also made to suit local conditions. For instance, in western and central Uttar Pradesh, mud-roofs were found very cheap and convenient. In the hills, iron-sheets, wooden or stone-roofs were found more suitable and stone-walls in place of *kutchha* walls were easy to make.
- (d) The width of the room was reduced by two feet because the rafters of more than 10 feet length were not locally available in the rural areas. The cost of these buildings was estimated to be Rs. 2,000 out of which Rs. 1,000 were given by the Government in the form of subsidy while Rs. 1,000 were to be found from local resources in the form of cash, material or labour.
- (e) These buildings worked better where there was no heavy rainfall whereas in inundated areas they were liable to collapse.

In 1957, the question of revising the 1948 Plan was re-examined and the Chief Engineer, P.W.D., was consulted in the matter. He has suggested some Type Plans for the following which are being examined and will be finalised shortly :—

1. Single-teacher Primary schools
2. Two-teacher Primary schools
3. Full-fledged Primary school in urban areas
4. Junior High school for boys
5. Junior High school for girls

In Uttar Pradesh, Primary school buildings have always been cheap and useful. The cost ranges between Rs. 3,000 to 4,000. For one big room with a verandah and a teachers' room the cost would be about Rs. 4,000. This type may replace the existing pattern of building of three rooms costing about Rs. 6,000 and thus save about Rs. 2,000 per school building which may be utilised elsewhere for school buildings, as non-recurring funds earmarked for school buildings cannot be utilised towards payment of school teachers' salaries. It is, however, felt that a single-room school is hardly a desirable solution on account of the disturbance in the work of

various classes. Teaching in the open in the summer and rains is not always possible due to the extreme climate of U.P.

#### **LACCADIVE, MINICOY AND AMINDIVE ISLANDS**

In these islands, no regulations for school buildings have been drawn up yet. The Department of Education approves building sites before considering the plans for schools buildings. The availability of site has been the only guiding principle so far as the standards of sites are concerned. After approval of site, the Department of Education conveys its requirements to the Public Works Department and they put up designs for the buildings which have finally to be approved by the Department of Education.

With a view to overcoming the shortage of school buildings, the Administration put up some temporary sheds recently. These will, however, be replaced by *pucca* buildings in course of time. A separate sub-division of the Public Works Department has also been created to expedite the building of schools.

#### **MANIPUR ADMINISTRATION**

This Administration has drawn up regulations for school buildings and they are suggestive. The Department of Education is concerned with the planning of Government schools. In the case of aided schools, the managing committees submit their plans for approval to the Education Department. The Department also approves building sites before considering their plans for construction. This Administration has also devised a cheap form of building for schools and has introduced shift system with a view to meeting the demand. The cost of these temporary buildings works out to about Rs. 5 per sq. ft. There is also a scheme according to which the cost of school buildings is shared equally between the Government and the local communities. The latter, however, has the option to contribute its share in kind.

#### **TRIPURA**

In this Territory, sites for buildings are selected by the Education Department and the building plans are prepared by the Department of Public Works on the basis of the requirements as indicated by the Education Department. Plans have also to be approved by the Education Directorate for the functional utility of the school building and by the Health Directorate for the fulfilment of hygienic conditions. In case of schools newly taken over by the Government, the Education Directorate have issued some regulations which have to be enforced except in such cases as are exempted from these regulations for some special reasons.

The State Government has also evolved a scheme for financing the construction of school buildings. According to this scheme, grants are given on aided self-help basis to local committees. The local committees, wherever possible, put up mud-wall constructions according to specifications suggested by the Education Department and the grant is made available to the committee in kind. The use of movable partitions is also recommended in the construction of new schools.

### CHAPTER III

#### THE PROJECT

With the attainment of Independence the concern regarding school buildings has multiplied manifold. As stated earlier, the directive principle of the Constitution has laid down that free and compulsory education should be provided to all children till the age of 14 years within ten years of the commencement of the Constitution. When this principle was enunciated, the total number of pupils of the age group 6-14 was 6.8 crores and out of this, only 2.2 crores were at school. Even without taking into consideration the increase in population it would have meant providing more than a million classrooms to cope with the problem. The building of these rooms, with other necessary facilities and equipment, would naturally be beyond the financial resources not only of this country but of any country and that is one reason why the directive principle of the Constitution is not being fulfilled within the prescribed limit..

While the problem was being considered in all its phases, it became possible to secure with the courtesy of the Technical Co-operation Mission, the services of an expert from the U.S.A. This expert joined the Ministry of Education in December 1956, and with a view to understanding the problems and seeing the conditions in the country for himself, he visited different States, contacted their Departments of Education and tried to understand their problems. Soon after the completion of this stage, a team was set up at the Centre to consider the problem further and suggest a solution. This team consisted of an officer of the Ministry of Education and a senior Architect from the Central P.W.D., in addition to the T.C.M. Expert.

As a preliminary to their work, this team sent out two questionnaires—the first to the State Governments and the second to teachers, administrators and educationists for eliciting their opinion in regard to important educational matters and requirements. These questionnaires are included in the Appendices to this Report. Then the team decided to divide the country into suitable regions on the basis of climatic and other considerations and hold seminars in each region. It would have been ideal if a seminar had been planned for each State, because it would have afforded opportunities to the representatives of the State itself to raise the problems, discuss them with the experts and then work out solutions most suited to the circumstances of the State itself. But there were important considerations, especially in respect of time, which did not make it possible to hold seminars at the State level. Regional seminars, therefore, came as a compromise. They, however, had the added advantage of enabling the representatives of a State to know the problems of

the other States and also have an insight into the methods of solving them.

Five seminars were, therefore, planned for the country and their details are as follows :—

| Region       | Venue of the Seminar    | Dates                     | Participating States                                      |
|--------------|-------------------------|---------------------------|---|
| I. Western   | Mt. Abu                 | 13th to 16th May, 1958    | Bombay and Rajasthan                                      |
| II. Northern | Tara Devi (Simla Hills) | 10th to 13th June, 1958   | Punjab, Delhi, Himachal Pradesh and Jammu & Kashmir       |
| III. Central | Bhopal                  | 24th to 27th June, 1958   | U.P., Bihar and Madhya Pradesh                            |
| IV. Eastern  | Calcutta                | 22nd to 25th July, 1958   | Assam, West Bengal, Orissa, Tripura, Manipur and N.E.F.A. |
| V. Southern  | Mysore                  | 19th to 22nd August, 1958 | Andhra Pradesh, Madras, Mysore, Kerala and Pondicherry    |

Each State was requested to depute four participants to the regional seminar and they were (i) an educational administrator, (ii) a Basic Education expert, (iii) an architect, and (iv) an engineer. In case of Union Territories, only two representatives were invited—an educational expert and an engineer or architect.

Out of the fourteen States, eleven States participated in the seminars. The States of Orissa, Kerala and Jammu and Kashmir did not send their representatives. In case of Union Territories, Tripura, Andaman Nicobar Islands and Laccadive, Amindive and Minicoy Islands were not represented.

The reason for inviting experts from different professions and asking them to work on a common problem is obvious. It was realised that a school building project was not and could not be the sole concern of an educationist, an architect or an engineer. It was to be the outcome of the cooperative efforts of these experts and the closest possible collaboration between these agencies was, therefore, essential to produce useful results.

With a view to directing discussion in a planned way at the seminars, a guide-line was thought necessary. A work-book was, therefore, planned by the team at the Centre and it is included in Appendix III of this Report. It began with the educational programme, drew attention to the philosophy and psychology of education, defined the ideal teaching environment, considered the practices needed in the school and the facilities required for it, drew out the plant implications of a school programme, laid down the characteristics of a good school plant and finally listed the various planning problems for discussion. Besides, it also suggested a new approach—the *nucleus approach*—to the planning of our schools for the future and tackling the problem of bringing the vast numbers into the school successfully.

The procedure at the seminar was very much simplified. The usual functions of inaugurations and closing addresses were done away with. The participants met in a most business-like manner and with an introductory speech from the representative of the Ministry of Education welcoming the delegates and explaining the background of the project, they set themselves to the task before them.

Messages from Shri K. G. Saiyidain, Secretary, Ministry of Education, Shri J. M. Rijhwani, Chief Engineer, Central P.W.D. and Dr. P. D. Shukla, Deputy Educational Adviser, Ministry of Education, were read and distributed amongst the participants at all the Seminars. Shri K. G. Saiyidain said as follows :—

“I am glad to learn that a Seminar is being organised under the auspices of this Ministry to study the problems of school buildings to which a good deal of thought has been given by educational administrators in recent years. The problem has been examined both from the point of view of improving the functional efficiency of these buildings and of bringing down their cost. On the one hand, we are greatly dissatisfied with the material conditions under which education is being imparted to a tremendous majority of our school-going children and we are anxious to improve them as much as is reasonably possible. On the other hand, in view of the limitation of resources and the more urgent needs of improving the terms and conditions of teachers’ service and providing the minimum equipment necessary in the way of books and apparatus, we cannot afford to spend a great deal of money on construction work. Our problem, therefore, is to consider ways and means of bringing down the cost of school buildings by exploring all reasonable avenues of economy, including the preparation of simple designs using indigenous materials and making the maximum use of the space available. A good deal of thought has been given to this problem in the past also. Recently, the Ministry of Education has set up a team which, with the cooperation of a T.C.M. Specialist, is making a careful study of the problem. This Seminar which has been convened with the idea of discussing its tentative proposals and suggestions with educationists and architects etc., working in the States can make a valuable contribution if these dual considerations are kept in mind by the members. Some of them must be aware that the Prime Minister has also been specially interested in this matter and, in the interest of educational expansion, has directed that we should cut down the cost of school buildings as much as possible, being content with the barest minimum of buildings necessary and concentrate on improving the other aspects of education. I hope our ingenuity will be able to tackle this difficult and complicated problem..”

Shri J. M. Rijhwani observed :

“On the occasion of this Regional Seminar on Low-cost and Functional School Buildings, I send my good wishes towards the

success of the Seminar. I am sure the discussions and conclusions arrived at would be of great use to all concerned with the planning and construction of schools."

Dr. P. D. Shukla said :—

"The Union Ministry of Education, as you know, has set up a project on school buildings; and in pursuance of that project, regional seminars are being held in the country. This is one of the series.

"I wish it were possible for me to be with you and participate in your deliberations. But as it is not possible I send you my greetings and good wishes for a fruitful stay. I need hardly stress the importance of appropriate environment for imparting instruction to children. Your meeting here is most timely at this stage of our development when, on the one hand, there is a pressing demand for expansion of educational facilities and, on the other, there is an equally great dearth of resources. You have, therefore, to pool your experience and plan for schools which will be required for the millions of our children consistent with our present resources—schools which will combine the triple concept of economy, beauty and functional utility. You will also have to consider model plans suitable for different soils and climatic conditions which obtain in our country generally, and in your region particularly. The task is a difficult one, but I have no doubt with all your experience and knowledge you will be able to tackle it successfully.

"I wish you all success in your deliberations."

Towards the end of each seminar, committees were set up for each State to consider the recommendations of the seminar and evolve suitable plans for the construction of schools in future. It was also suggested that models of these plans should be prepared and finally exhibited in an all-India meeting where the work of all the regions should be consolidated for discussion and propägation of ideas.

The seminar approach adopted for the planning of schools for the future holds the greatest promise for the development of more functional and more economical schools. The architects, engineers and educators sat down together and learnt to plan together—a procedure which has been sadly neglected in the past. Each group learned to understand the problems of the other, appreciate the difficulties facing them, and suggest ways and means of solving these problems. Repeatedly were architects and engineers heard to say that they had not understood the meaning of activity type teaching and the importance of the classroom environment, and, what is more of how to provide a functional environment.

At these seminars, educators also learned to express the needs of their instructional programme in terms that could be understood by the architects so that they could design suitable facilities for the same. As a result of this cooperative type of planning, which we

hope would continue as these participants return to their States, the country will have new schools that are designed in terms of activity needs of the children and the community—schools that will give up many traditional features that were costly and lacked functional justification. Good team work between the architects, engineers and educators is bound to produce good, functional and economical schools.



## CHAPTER IV

### CHARACTERISTICS OF A GOOD SCHOOL

The changing curriculum and progressive methods of teaching require a new type of school. What is more, this change is never ending and will constantly continue. How, then, can we build schools that will fit all demands for many years to come? The present state of affairs in this respect is not very happy. Most of the existing schools cannot possibly provide the learning environment that is so essential to life-related activity teaching.

The changing school programme necessitates greater versatility of space. Up to now class-room space had no need for versatility. Space had only one job to do — to surround so many rows of so many students, and that is about all except possibly to provide some space at the front of the room so that the pupil or teacher could stand at the blackboard. The new programme demands that space must have multiple uses. Space must also have the qualities of ready convertibility to new uses.

The type of a class-room that is needed is cheerful and informal. It is bigger than class-rooms used to be and possibly different in shape. It opens to embrace a part of the outdoors to become even bigger and even more informal. It has ample storage space for equipment and supplies. Student seating is not regimented but permits of group work. It has a desk for the teacher, but it makes that desk a work centre instead of a throne. There is plenty of chalkboard and tackboard surface.

The first impression might be that these new type buildings can be provided only at greater expense. Experience of one country after another has proved that this is not the case. Where the skill of educators and architects has successfully cooperated, higher and higher standards have been accompanied by lower and lower costs.

The new type of planning by close cooperation of educators and architects, may make it necessary to abandon the old concept of allowing so much floor space to seat a child to the concept of how much floor area is needed to permit a group of children to carry on the vast range of educational activities called for in the overall educational programme of the grades to be served by that school. Various types of work and interest centres become the basis for determining the size and shape of class-rooms rather than making provision just for the seating of the individual child.

In our country where the climate is warm in most of the places, outdoor space adjacent to the class-room can more than double the amount of usable space. The covered verandah and the adjacent

open space must be planned just as carefully for its educational use as the inside of the class-room. Space to live not only reduces friction and opens new avenues to learning, but it helps a child to feel that he is an individual rather than an anonymous member of a herd.

Keeping these general remarks in mind, we now proceed to discuss the characteristics of a good school. They are as follows :—

(i) *Expansibility*: Every building should possess possibilities for logical expansion. The number of pupils and the number of grades do not, in most of the cases, remain constant. Every site should, therefore, have a master plan for all foreseeable demands. Moreover, schools in our country as elsewhere in the world, are more and more taking upon themselves the role of the community centres and are providing facilities for the social, educational and recreational welfare of the community living around them. This is a very healthy development and necessitates a very close cooperation between all agencies responsible for providing schools and other facilities for the community. Joint planning and joint use of facilities reduce costs and increase efficiency.

That money is well spent which clears the way for a more economical expansion later on. Therefore, funds spent for adequate and properly located sites and complete master plans are as important as funds needed to take care of the present needs. To not plan for the future now is to plan for a more expensive addition later.

(ii) *Curriculum Adequacy* : No physical plant can contribute significantly to a good programme of education, unless it provides adequate space for the desired educational activities to be carried on effectively. The school must, therefore, be planned to provide the facilities necessary for the efficient and effective accommodation of all the phases of the curriculum, all school as well as community activities for which it is intended. The educational philosophy and the specific services of the particular school should be the starting point in the design of the building and the development of the site.

The features of the class-room should be determined largely by the activities which are to be conducted in the room. The amount of space needed depends upon the type of activities and the size of the groups participating in these activities. Adequacy means more than the necessary amount of square footage—it means a quality level of square footage—it means a quality level of construction also.

(iii) *Flexibility and Adaptability* : A school plant should be planned for economical future adaptations to changing requirements. The building can be made more flexible by multi-use units such as all-purpose rooms, non-bearing partitions, open-end corridors and verandahs, and interchangeable storage units. The building itself and its placement on the site should provide for future additions without interfering with traffic-flow efficiency, the association of related units, and aesthetic balance.

There is a crying need in our country for designing schools that permit of better utilization of space. If a building is to serve efficiently, all areas should be planned so that they will be used as much of the time as possible. When educators have taken a leading role in a careful study of the space needs of each area, there will certainly be a more nearly maximum use made of the area.

(iv) *Economy* : A school plant should be economical in original cost, upkeep, and operation. The total plant need of the community should be considered so as to avoid undue cost of one project at the expense of other needed facilities. Economy however, involves more than a mere reduction in money outlay. The expenditure of additional money is actually an economy if the educational return per rupee is increased or if maintenance costs are reduced.

One should not be misled, however, by low initial costs of school buildings. The cheapest possible first cost is not always a true indication of economy. It is the long-range cost that really counts. Initial saving may soon be more than lost through abnormal costs for maintenance or replacement.

Economies in school design and construction can be effected through simplicity of design. School buildings should be designed and constructed for the education of children and not as formal monuments to posterity. It is agreed, however, that the school should be a source of pride to the people of the community.

There is no reason why a building cannot be educationally functional and at the same time have character and aesthetic expression of its own. A building that has both utility and beauty can be secured and this can be achieved economically. Such a building requires careful educational planning by the educator and creative designing by the architect. Much of the money spent for embellishments can be better expended in designing a more efficient building in terms of the community's educational needs.

Economies in school design and construction can also be effected through the preparation of complete, exact and accurate drawings and specifications and also by making the building as compact as practicable. In designing a building for compactness, serious consideration should be given to items such as exterior lines of the building, elimination of waste space, height of ceiling, and economical arrangement of all spaces.

(v) *Beauty* : The entire school plant should be cheerful, attractive and pleasing. The building mass does not need to be symmetrical, but it should have aesthetic balance. An open rather than a massive design, pastel rather than drab colours, spacious grounds and ample window space will add much to the general attractiveness of a school. A simple inexpensive building by means of proper use of colour and design can be made as beautiful as a very costly building.

Beauty which comes from good composition of the most suitable building materials, used honestly and openly to express the function of the school designed for children, is at once the kind of beauty that will make the school a better school and also express the ideology of the people.

(vi) *Health and Safety* : The school plant should be so planned as to protect the comfort, health and safety of pupils, teachers, and all who will use its facilities. Lighting and ventilation should be in accordance with best practice. Stairways and other structural and service features should be designed to meet safety standards. The school should not only protect children from harm, but should provide a healthful environment that will be a positive influence toward the best possible physical and emotional development for living, growing children.

## CHAPTER V

### ESSENTIALS OF PLANNING

In a previous chapter the impact of the changing trends in the content and methods of teaching on the planning of school buildings was brought out. In fact, no educational building can be planned properly until and unless the aims it has to fulfil, the scope of the programme it has to cater to and the methods that will be followed therein are known to and appreciated by those concerned with its planning. It is not easy to define these details because education is a dynamic study and not static. The planning of school buildings, therefore, is to be regarded as a continuous process and provides a constant challenge to the educators and architects.

Having realised the importance of proper planning in the construction of school buildings we now come to the next question—how it is to be done? There are three fundamentals in this regard which must be constantly kept in mind and they are (i) the pupil, (ii) the programme and (iii) planning ahead. Let us consider these in detail.

#### (i) The Pupil

School planning starts and ends with the pupil because we want schools that serve the needs of our children—physical needs as well as emotional needs. Every factor must, therefore, relate in some way or other to the school child.

The physical factors come first. They would include such questions as: Is the building properly ventilated for his comfort? Is the lighting adequate? Are there any disturbing noises? Is it away from the heavy traffic? Is it in healthful surroundings? Does it provide a suitable teaching environment and so on.

Then come the psychological factors. They include such questions as: Is the building a pleasant place to go to for schooling? Is it colourful and inspiring? Is it restful? Does it make the children feel good to be in the building? The answers to these questions will tell us whether the buildings have been planned keeping the pupil in view or not.

#### (ii) The Programme

Then comes the programme. It is to be interpreted in terms of educational specifications with a view to making the premises most functional. Each school, it has been said, should be built three times. First “building” is by educators in the form of educational specifications which describe the educational programme. The second “building” is by the architect in the form of architectural



Cooking is an essential activity in every girls' school



**Even shooting is practised in our schools**

specifications and working drawings which interpret educational programme needs. The third "building" is by skilled craftsmen in brick and mortar.

Greatest waste in school construction has resulted from lack of sufficient attention to the first step—educational planning. Even where educational planning is considered important, it is not usually carried to a point of preparing detailed description of the educational programme to be housed in it. This description, in the language of the architect, is called the educational specifications. It includes detailed description of groups of pupils to be housed, kinds of educational activities to be carried on in each separate room, kind and amount of equipment, supplies, and furniture to be installed or stored in each part of building, and so on.

One of the most important considerations in educational specifications is to effect economies. To date, greatest efforts by educators in this direction have been through the architects, but this is not enough. Cooperative efforts of educators and architects are needed to produce simple, modern and functional structures and this approach wherever it has been tried in the world has produced striking economies.

The neglect of educational specifications results in buildings that do not fit today's best educational concepts and completely ignore the proposed programmes of the immediate future. It also leads to the putting up of buildings and providing spaces which are highly non-instructional. It is absolutely essential to eliminate all non-functional or little-used space. If this were done, a lot of money would be saved and that could be utilised in other ways—building more schools, expanding their facilities, improving the quality of instruction, enhancing the status of teachers and so on.

Finally, it must be borne in mind that instructional spaces are to be designed for learning rather than for teaching. This is a way of pointing out that many things have been taught in our schools which have not been learned and that much has been learned that no one intended to teach.

To sum up: Educational specifications describe educational programme in terms of processes and activities to be carried on by various groups that use the building. More precisely they describe people and what they will do within the class-rooms. As educational programmes become more community related, more after-school and evening, week-end, and summer use of the school facilities by the community must be expected and be regarded as an essential item for school planning.

### (iii) Planning Ahead

Planning of schools must be on a long-range basis and schools should be planned not for today alone but for tomorrow also. The buildings which are planned and built today will have a pronounced



effect on the educational programme for at least the next 50 years, if not more. They may limit the programme and prevent desirable changes or they may be such as to encourage constructive programme changes depending upon the vision and skill of those now engaged in the planning and design of school buildings.

Long-range planning can be successful only if there is a master plan for each school. A master plan is a plan for a particular site for all present as well as all future construction. It takes into consideration all the possible present and future uses that may be made of the site by the school and by the community. Master planning of the village school can be the key to the solution of ever so many problems and the cost involved would be negligible. It can save more money than any other one thing connected with the school building programme. Inversely, lack of master planning has been the cause of terrific waste of public funds not in this country alone but in other countries also.

To properly provide for the future we have to take into consideration the school as it would develop in course of time. What grades it would serve and what its ultimate enrolment would be are important factors in this connection. Besides, it will also have to be considered as to what grades would be housed on that site when compulsory education is introduced in that area.

There will be certain other important considerations also in regard to future development. It has, for example, been suggested that a house for the teacher should have a higher priority than the school building. If this is accepted, we will have to decide as to how many teachers' houses would eventually be on that particular site and what space for gardening should be given to each house.

Similarly, the demands of new programme will also have to be visualized as clearly as possible. Formerly, school buildings were designed to provide spaces where a few people sat to be instructed—now schools are conceived to be activity areas where all children and youth go to participate in exercises resulting in understandings, attitudes, skills, ideals and appreciations enabling them to live as intelligent social beings. To ignore the demand of the new programme will result in an early obsolescence of the school and a very costly reconversion in the not very distant future.

Where community development projects are functioning every effort should be made to plan cooperatively with them and to try to make the school one of the facilities to serve the community. As a result of these projects there is an increasing demand amongst the people for facilities that help to bring about a better way of living—there is a demand for clinics, for reading rooms, for recreational activities etc. Many advantages would accrue if planning for these demands is done jointly with the concerned agencies. For instance, the community hall if planned near the school can serve the school as well as the community. Similarly, school playgrounds if planned



An art group at work



A carpentry class at work

properly can serve the recreational needs of the community and a clinic can do likewise.

These are the three essentials of planning schools and have to be carefully borne in mind if we wish to have schools which would meet the changing needs of the pupils, the programme and the society. The acceptance of these principles envisages a reorganization of present planning practices. The present conditions in respect of government buildings in this respect are that in case of small buildings no planning is considered necessary; in case of larger buildings the planning and construction are entrusted to the Public Works Departments. There is provision for the approval of these plans by the respective Education Departments but, in practice, the last word rests with the Public Works Departments. In certain cases the Education Department is considered only as an agency of providing the necessary funds for the purpose.

From the educational point of view, the provision of an effective teaching environment is more important than the provision of buildings only. This is so because the teaching environment is becoming more and more a tool of teaching and, consequently, the emphasis is not so much on built-areas as on the provision of good, effective and helpful teaching environment.

This consideration makes it imperative to have each school individually tailored instead of conforming to standardized and uniform patterns of construction and design. In a recent survey by the UNESCO it was discovered that most of the countries of the world have found it necessary to establish school planning and construction agencies within their Departments of Education to cope with the problem of planning schools properly and effectively. It is not a question of the Public Works Departments being inefficient or incapable of doing the task. Far from it. The planning of a school is primarily a problem of converting educational specifications into facilities that will serve as a tool to the teacher in the proper discharge of his duties and only educators are capable of dealing with this intricate and tremendous problem. The regional seminars which were organized for the purpose of planning functional schools for India considered the various aspects of this problem and came to the conclusion that each Department of Education should have a comprehensive unit of an architect and an engineer with the necessary staff in order to expedite adequate planning and quick construction.

It is not our intention to set up a parallel agency to the Public Works Department in the Department of Education. Our idea is to emphasise the need of making strong efforts to bring about closer cooperation and better understanding between the architects and the educators. Educators must be made responsible for the planning of schools because it is they who best know what the ideal learning environment should be. Planning and approval of plans should,

therefore, rest primarily with the Department of Education and no other agency should have the right to alter any plans—for, any alteration of plans, no matter how small, may drastically reduce the educational adequacy of the facility planned. Educational administrators should also on their part see that the educational specifications are properly defined by the educationists, communicated to the architects and interpreted on paper in such a way as will help the learners most without any wastage of spaces or public funds.

## CHAPTER VI

### IMPORTANT CONSIDERATIONS IN PLANNING

In the last two chapters we have discussed the characteristics of a good school plant and the essentials of planning. But what was said in those chapters is in general terms and has to be properly interpreted and translated before it can be applied to specific situations. Now we propose to discuss some of the problems which have an immediate and direct bearing on the planning of schools.

#### Size of Class :

The most important problem in this context is the size of the class because it determines the amount of instructional space needed for each unit. Generally speaking, we in this country look upon 40 as the maximum number which a teacher can conveniently handle. There is also a general and continuous trend towards smaller classes. Recent knowledge about the vast individual differences in learning abilities has led us to the conclusion that unless the programme of education is adapted to the individual needs of the children, they will not profit much from instruction.

There is no doubt that small classes are desirable. They increase the personal contact between the teacher and the pupil, permit of changes and variations in the programme of instruction to meet individual needs, help in developing one's interests, and also make individual attention a practical proposition. But should we favour small classes at any cost? Some educators take a very narrow-minded view of this problem—as long as they can have small classes it does not seem to bother them in the least that by so doing they are depriving millions of children of any schooling facilities whatsoever.

The most immediate and important thing for us at the present juncture is to get all children into school. It will make very little difference whether there are 40 children per class or 45. The teacher-pupil ratio in the country at the end of the First Five-Year Plan was 1 : 33. The Panel on Education set up by the Planning Commission recommended the raising of this ratio to 1 : 40 without delay and if necessary to 1 : 50. The Ministry of Education has also recommended to the State Governments to raise this ratio to 1 : 40. This means that the actual size of a class will have to be above 40. The acceptance of this suggestion alone will increase the existing accommodation in our schools by more than 20 per cent.

While increasing the teacher-pupil ratio as suggested by experts, we should also take steps to equip the teacher better to do his job. Some educators believe that with modern methods of teaching and with plenty of equipment a teacher can do a better job of teaching 50 pupils or more than another teacher could with only 30 pupils

but lacking proper methods and equipment. If the training of teachers is limited, as it is in some cases at the present moment, even 25 pupils per teacher are really too many. With upgrading of teachers and supply of suitable and adequate equipment, it should be possible to do better work with even double that number. If compulsory education is to be introduced as provided in the Constitution and if the status of the teacher is to be improved then there is only one way of doing it—improving the teachers' quality and increasing his output.

As stated above, class size of 40 at present is the most commonly accepted standard for planning. Whether this is realistic or not remains to be seen but school planners cannot and must not ignore the strong probability backed up by statistics that the rooms that are being built now may, after some years, have to accommodate more than 40 pupils. They must, therefore, take all precautions to cope with this eventuality.

#### **Size of Classroom :**

The size of the teaching space is the next important consideration in planning. The teaching space can be designated under three classifications : (i) enclosed space; (ii) sheltered space; and (iii) open space. Every teaching area needs all these three spaces and is inadequate if it lacks any one of them. These areas are not to hang loosely but have to be properly coordinated. This can be done by having these areas so placed to each other that a teacher can supervise all of them at the same time. This will enable him to make use of the activity type teaching and use all the three areas simultaneously most of the time.

The primary function of the enclosed space is to provide storage for supplies, equipment and projects; that of the sheltered space is to protect the class from sun, rain and other inclemencies of the weather; and that of the open area adjacent to class-room is to provide planting space for shrubs, flowers, garden, fish pond etc.—space that is needed to relate learning to life.

When teaching was formal and academic, a class-room of the size of about 400 sq. ft. was considered as enough for 40 pupils. The report of the School Buildings Committee of the Central Advisory Board of Education in India published in 1946 came to the conclusion that 10 sq. ft. should be recommended as the minimum floor area per pupil in primary schools. With the change in methods and programme of education, this size does not appear to be very suitable. The National Council on School House Construction of the U.S.A. has recommended a minimum of 30 sq. ft. per pupil for elementary class-rooms. In the U.K. and other progressive countries also, there is a strong tendency to increase the space allotment per pupil. Taking these factors into consideration, it is suggested that in our country the covered area (enclosed and sheltered) should be at least 600 sq. ft. per teacher. It will also be desirable to so plan schools that thi

area can expand with the years to meet the increasing demands of the activity type programme.

The activity type programme requires an informal class-room arrangement where most of the time different groups of pupils will be working on different projects. For some time, a teacher might be doing formal work with one group of students while other groups might be working on projects in or near the class-room. Bearing this in mind it appears that the best utilization of space for the activity programme can be obtained from a class-room that is almost a square. This shape of the class-room is also generally considered ideal for proper supervision of the activity programme. To obtain a square work area, it is desirable to combine the class-room area and the verandah space. Pillars within the class-room space are not objectionable for the carrying on of the activity type programme. In fact, for activity type teaching it is much better to have a room which is much longer than it is wide.

Another feature that is of utmost importance to the activity type teaching is proper correlation of the adjacent out-door space for use as instructional space. This will provide ample opportunities to smaller groups working together on some projects according to their own interests. Doors and windows, however, must be so placed that the teacher can adequately supervise groups working outside as well as inside the class-room.

#### **Size of School :**

The size of school is another important consideration in planning schools. With formal type of instruction it is not so important as in the case of the activity type teaching. Activity type teaching needs more equipment, more supplies and more facilities than the formal type of instruction. It also needs provision of extensive playgrounds, reading rooms, libraries, lunch facilities, health rooms, assembly hall, auditorium, workshops and so on. If all these things are to be provided for in small schools, the cost per capita becomes prohibitive. Having fewer schools and consequently larger schools in the future on a nationwide basis would lead to immense economy because the improvements, even though they may cost considerable sums, will be used to the maximum. Statistics are available from some countries comparing construction, equipment and operation of small (with an enrolment of about 200) and large (with an enrolment of about 600) schools and it is seen that small schools will cost at least 50 per cent more per capita than large schools.

The most economical size of a school, therefore, is to be determined keeping these various factors in mind. There was a wide difference of opinion at the different seminars in regard to this point. In some cases, it was suggested that the optimum strength should be 200 for a junior Basic school and 350 for a senior Basic school. In another case, 550 and 850 were suggested as the optimum numbers respectively. We do not have any objective evidence



pertaining to this country in this regard, but on the basis of evidence available pertaining to other countries, we feel that in populous areas the optimum number for a junior Basic school should be roundabout 500 and that of a senior Basic school roundabout 800.

#### Size of Site :

The most important single act for the school planners is the selection of a suitable site for school building. It must be large enough to provide for all present and foreseeable future needs of the school—these include additions to the building in the shape of class-rooms and other accommodation, provision of special facilities *e.g.*, health facilities, physical education requirements, guidance services, community recreation programmes, teachers' houses and a garden for them etc. Determination of site, therefore, is a process of synthesis of current programme demands coupled with an allowance for future changes and extensions.

Since the site has to be selected far in advance of immediate building needs, it becomes pretty difficult to determine exactly the nature of the future building and the needs it will serve. Considerable thought should, therefore, be given to it before taking a final decision in the matter.

The original cost of a site may seem rather large and cause much concern but it should be kept in mind that this single important investment is the least expensive part of the entire project. When one considers that the site will serve the community for possibly a hundred years or more and that many thousands of school children will utilize it, we can see that the first cost, even though large, will be relatively very small. Too often, the most desirable site is rejected because it costs two or three times as much as an inferior or smaller site. This first decision when it is wrong is the most costly one made. A site poorly located is costly; a site too small is even more costly; a site purchased or expanded too late can be highly costly.

Most of our school sites are too small. Modern schools require sites larger than what were considered necessary a generation ago and this tendency is discernible all over the world. Larger areas are necessary because the continued expansion of educational programme, the greater use of schools by the community and the necessity of making provision for sufficient space for present and future building needs.

Experience has shown that sites of inadequate size have been one of the primary causes of the obsolescence of school buildings and curtailment of school community programmes. As ultimate site requirements have to be met in most of the cases from the initial site acquisition we suggest that a Basic school should have a minimum site of two acres plus an additional acre for each hundred pupils of predicted ultimate maximum enrolment or part thereof. Where

agriculture is taught as a basic craft, an extra area of five acres is considered to be essential.

At some seminars it was felt that the limits laid down above should be strictly adhered to in rural areas ; whereas in case of urban areas some latitude would be essential. We, however, feel that there is no reason why the limits laid down should not apply to urban areas. In the newly-developed urban areas, the question of reducing the standards does not arise ; in case of thickly populated areas, however, we suggest that all possible efforts should be made to see that the limits laid down are followed because inadequate sites would adversely affect the school programme and its utility. In such cases, the location of a school adjacent to a public park or playground which could be used for school purposes is also worth consideration.

What we have suggested above should in our opinion be taken as the minimum for which all should strive and which most should exceed. Each type of situation, however, it should be noted, has its own specific variations which must be studied carefully before sites are finally selected.

After selecting the site, the relationship between the organisation of space within the school building and the organisation of exterior areas should be given due consideration. Outdoor teaching spaces, assembly areas and the playgrounds should be so planned as to cause least disturbance to one another. Every precaution should be taken to plan playgrounds for maximum safety. Apparatus should be segregated from lines of foot traffic and playing fields should be laid out so that balls will not fall into other activity areas.

The most desirable contour for a site is a slightly convex surface as it permits of locating the building at the high point and provides adequate drainage without heavy maintenance cost. The environmental factors and sub-soil conditions should also be carefully considered—the latter being such as would provide good drainage and a proper base for the foundations of the building.

The location of the building on the site is also important. It should be at a sufficient distance from the streets to minimise noises and should permit the maximum utilization of the entire area for outdoor educational and recreational activities and lead to development of the various areas for these activities in their proper relation not only to the building but to each other also.

### **Administrative Facilities :**

Administration has a vital function in the school as a whole and acts as its nerve centre. Proper facilities, therefore, have to be provided for this aspect of work and organisation also. The extent of these facilities will depend on the size of the school, the number of teachers, the kind and extent of programme, and so on. In a

single-teacher school, for example, the administration area will practically be non-existent; in a bigger school, some rooms will be needed; but in a very large school, a separate block will have to be provided for the purpose.

Whatever the size of the administrative unit, it should be centrally located with respect to the total activity of the school. It should also occupy a position near the main entrance to the building so that visitors may easily find their way to it.

The administration area, moreover, should be so planned that it can be added to by stages as the need for additional services arises. In most countries, expansion of the administration area has been more rapid than that of any other part of the school. Changing concepts of education require more and more services to be performed by school administration.

The headmaster's room, instead of being a retiring room for him, should be regarded as his work room where he plans the operation of the school and carries on study activities. It should be large enough to accommodate the headmaster and a limited number of visitors besides providing some space for storage of equipment and projects.

#### **Assembly Hall :**

In the past, an assembly hall used to be regarded as an indispensable adjunct to every school plant but things are now changing and the traditional assembly hall can hardly be justified in view of the great need for other school facilities. In the case of senior Basic schools, we, however, suggest the provision of a multipurpose room which should be considered as an essential facility for every school.

A multipurpose room is a room so designed that it can serve various functions and thus can be used full time. It may well serve as a room for instruction in crafts, music, physical education, school lunches and a great variety of other activities that require more space than can be found in the class-room. This room should not have any fixed equipment so that a great variety of activities could be accommodated in it. Even a built-in stage is not desirable since such area generally has a limited use. It is better to have a portable stage that can be set up for special performances. Moreover, the stage should be on the longer side of the assembly area because it helps hearing and brings the audience closer to the stage. For best hearing and seeing conditions, it is now generally accepted that an assembly area should be at least one and a half times as wide as it is deep.

In practically all cases, an open air assembly shed will be more functional than an enclosed hall. Just leaving out one of the walls even will greatly increase the utility of the hall—many pageants and plays could thus be staged that will coordinate the indoors and the

outdoors and larger audiences could also be accommodated on special occasions. A great variety of instructional activities could also be fitted into this area which cannot be accommodated in an enclosed hall with its limitations.

### Library:

As the programme of our schools is changing from formal instruction to one more concerned with activities and the real needs of pupils, the school of the future will have a much greater variety of reading and reference material. We have, therefore, not only to provide for its use and storage but also for its proper display. As such, the importance of providing a good library in each school has increased considerably.

A junior Basic school need not have a separate library but a senior Basic school should certainly have one. It should be the centre of the intellectual life of the school and, instead of being isolated from the main building, should be in a central position where it is easily accessible at all times of the day from all the teaching spaces.

All educators agree that library books should not be merely stacked but should be used as often as possible. Most of them, therefore, feel that the classroom library facilities should be extended and books from a central school library, if there is one, should be placed in the classrooms where their use can assist and motivate instruction. As such, a small central library in the administration area for storage purposes is very desirable. But provision should be made so that teachers can take books easily and conveniently to their classrooms as they need them. This requires some simple means of transporting books from the central storage library to the classroom. It also necessitates some shelving space in the room for the proper display and storage of library books.

Shelving space should be provided very carefully. If shelves are too high, children will not be able to make proper use of them; if they are too deep, they will cause annoyance. The dimensions of a shelf should be  $7/8$  inch thick, 8 inches deep and three feet long. For larger illustrated books, shelves 10-12 inches wide are required. It is, therefore, desirable to have some flexibility in the height of shelves—some being 8 inches high, others 10 inches and still some others 12 inches high. As a general suggestion we might say that 80 per cent shelves should be 8 inches high, 10 per cent 10 inches high and another 10 per cent 12 inches high. The total height of shelving space should not exceed four feet in a junior Basic school and  $5\frac{1}{2}$  ft. in a senior Basic school. The bottom shelf should be from 4 inches to 6 inches from the floor and should be tilted back to allow easier reading of titles. Moreover, the space under the bottom shelf should be closed to facilitate cleaning.

There should be a separate magazine rack also. It should have vertical sections for current magazines and below them closet space

should be provided with shelves to hold back numbers. This rack should be so planned that small children can actually read the titles of the periodicals exhibited therein.

The library should be attractive and informal. Children should think of it as a comfortable room, where they might like to go for work and study. Chairs and tables should, therefore, be comfortable and adjusted to pupils' heights. The colour scheme should be attractive and delightful and lighting sufficient. Access to books should also be easy and newspapers and periodicals should be so displayed as to attract attention and invite study. Proper display space should also be provided so as to enable new titles and other relevant material to be exhibited.

The library in short may be looked upon as a laboratory, the work and services of which are integrated with all the educational activities of the school.

#### **Craft Space :**

With the expansion of Basic education, emphasis on craft work is bound to increase. The inclusion of this kind of work in the instructional programme creates two problems and they are : (i) larger floor space needed for craft activities, and (ii) proper storage of craft equipment, supplies and projects.

Basic education accepts a craft as one of the centres of correlation. It would, therefore, be helpful, especially at the junior stage, to carry on as much craft work as possible in the classroom itself. In case of senior Basic schools, however, separate rooms for different crafts become essential. These rooms should be larger than the usual classrooms and if storage arrangement for the equipment could be made satisfactorily, a shed would serve the purpose.

In case of spinning it was suggested at one of the seminars that a separate carding room is essential. It was pointed out that (i) an ordinary classroom is not suitable for carding because it is not built that way, (ii) carding makes a room rather untidy and also unhealthy to breathe in, (iii) a lot of saving would be effected in time if pupils could go to the carding room for their work in small batches by rotation, and (iv) carding equipment will require additional storage space in each classroom if there is no separate carding room. It is, however, felt that this issue needs further study especially because it seems difficult to arrange effective supervision of small groups going into that room by rotation and doing their work properly.

#### **Health Services :**

Health education is now regarded as an integral part of General education. Schools are, therefore, providing more facilities in this regard than they used to do in the past. Some space for health services, therefore, must be provided in every school.

In order to make health education programme fully effective, every school should have at least one small room. In bigger schools, a health suite with adjoining toilet and storage facilities will be necessary. This room or rooms should be centrally located near the administrative unit and should be away from interfering noises. If the health facility could also be expanded to serve the community, it would be ideal. It may incidentally be remarked that health rooms should be attractive and informal and should avoid the dispensary or hospital appearance.

#### School Lunch Facilities :

More and more authorities in our country are coming to the conclusion that a school lunch programme is a "must" if our schools are to be upgraded and compulsion is to be properly enforced. This is so because the provision of school lunches will not only meet the basic physical needs of pupils and encourage inculcation of good eating habits but will also provide an excellent learning laboratory for teaching acceptable social behaviour. Facilities for school lunches should, therefore, be included in every school without exception. These facilities must perforce be very simple—merely a small kitchen where food could be prepared or even warmed with enough storage space for supplies and utensils will be enough. It is not necessary to have a dining hall—children can eat in the corridor, in the classroom or under the shade of a tree.

#### Drinking Water :

Every school building, whether big or small, should have adequate provision for drinking water. Where water supply system exists, drinking fountains should be provided in the ratio of one for every 50 pupils with a minimum of two in a school building. These fountains should be such as will not permit the mouth of the students to come in contact with the nozzle or permit water to fall back on the nozzle. Instead of locating all the fountains in one place, it would be advisable to spread them out and strategically locate them in different places.

Where water connections do not exist, there should be adequate drinking water provided in every school. Some *matkas* properly covered should be provided at the rate of one for every 30 pupils and arrangements should be made for having them cleaned and filled regularly. The number of these *matkas* would be more in summer months than in winter months. It would be preferable to fix a water pipe and a tap with each *matka* so that the need of putting utensils or hands into the *matka* is avoided.

It seems worthwhile in this connection to recommend to the Community Development Project authorities or other concerned authorities to give first priority to providing a pump on a well nearest to the school in all rural areas and to provide a connecting pipe line so that the school can be assured of a good and adequate water supply. Where this is done, a storage tank with taps should be provided and it will facilitate the activities of the school immensely.

### Sanitary Arrangements :

Adequate, well-arranged and properly maintained sanitary facilities are also essential to the health, comfort and convenience of school pupils. As things are, these facilities are generally neglected in our schools but this neglect is not only undesirable but positively harmful. The formation of good health habits is considered an essential objective of education. It is, therefore, imperative for our schools to provide proper physical facilities so that pupils have all the opportunities to put theory into practice.

Care should be taken to see that these facilities are orientated properly with reference to all the buildings that exist on the school site. If water supply and drainage systems exist, there should be flushing latrines; in other cases, a soakpit or gopuri type or wardha type trench latrines should be provided and their proper use insisted upon.

The number of lavatories should roughly be four per cent of the enrolment of the school. In case of boys, there should be one lavatory for three urinals. Separate provision, it is suggested, may be made for teachers. Each closet should be at least 2 ft. 6 inches to 3 ft. in width and at least four feet in depth. The floor of the latrine must be of some impervious material which can be washed and is not disintegrated by urine. The walls of the closets must be of a smooth non-absorbent substance and it must extend to at least 3 ft. above the seats.

It is our considered opinion that nothing short of the highest standards of cleanliness should prevail in the lavatories. In the absence of these standards it will be impossible for boys and girls to develop proper attitude to healthy and successful living and to inculcate proper habits of health and sanitation. If these places are dirty and unattractive, they become undesirable parts of the school environment and no amount of formal teaching can overcome the damage done. If these conditions are fulfilled, these high standards of cleanliness would as a matter of course be carried on to the community as a whole. Good ventilation should be assured in these places so as to keep them free from objectionable odours. Hooks and shelves may also be provided in the toilet compartments and there should be plenty of hand-washing facilities so that children could wash their own hands, comb their hair and clean their teeth.

### Storage Space :

The activity programme creates a serious storage problem. There is a much greater variety of items to be stored in the activity methods than in the formal methods.

In the latter case, the teacher has usually to make arrangements for the storage of school records, registers, forms and stationery in addition to maps and some teaching aids. In the case of the former, however, these things are not enough and space has to be found

for storing tools and raw materials for craft work, craft products and equipment for mid-day meals, library books and museum exhibits in addition to a great many teaching aids. But above all these, there are many unfinished products that need to be kept safe and will occupy a lot of storage space. It is imperative, therefore, to provide enough storage space not only for the school as a whole but in each classroom also.

The provision of storage space can be done in two ways—by built-in cupboards and by storage cabinets. The former save space and are economical; whereas the latter make it convenient to be increased or decreased and also be shifted from one place to another. In our opinion, as much built-in storage space be provided in the classrooms as is possible but it should not go beyond the height of the teacher and roughly half of it may be lockable and the rest uncovered. Place under the window sills should also be used for the purpose.

In addition to the built-in storage accommodation, storage cabinets may also be necessary. The best place for storage cabinets, however, is a debatable question. Some prefer such storage in the front of the room where it is easier for the teacher to have access and effective supervision. In certain other cases, all storage cabinets are put along the back wall of the classroom while all wall-spaces on the other three sides are used for chalkboard and display purposes. If the storage cabinets could serve the dual purposes of storage and display, they could safely be kept in the front of the room but if they are meant only for storage purposes we suggest that they may be relegated to the back wall.

Another suggestion that we could offer in this connection is that, in some cases, the storage cabinets may be of table height so that they could also be used as work spaces.

A word of caution must also be uttered in regard to the storage of teaching aids especially maps. It is not an uncommon experience to see them kept in a most disorderly manner. One of the ways that we suggest in this connection is to provide a cabinet with grooved rollers to keep them in position. To prevent insect damage, D.D.T. may be sprayed. This cabinet could also be used as a work desk or a display table. Simple cotton or plastic bags may also be used to keep the maps. If this is done, every bag should be numbered and an index card prepared to identify them.

While speaking of storage facilities, it seems essential to emphasise the need of preventing the deposit of dust, rubbish or litter. The use of door-mats or foot-rugs by the pupils, the depositing of rubbish and litter in dust bins placed in allotted places in the school compound and classrooms, cleaning and tidying of classrooms by the pupils themselves and removal of the accumulated rubbish in the dust bins to compost pits at a reasonable distance from the school buildings are all activities which raise the school standards and improve the civic consciousness of the pupils.



### **School Furniture :**

The furniture requirements of each school have to be carefully planned. Somehow it has not been possible for us to consider the different types of furniture in use, suggest that which is most suitable for class use and also indicate its specifications. There are three important points, however, to which we would like to draw the pointed attention of our readers. In the first instance, it should be such as meets the individual sizes of pupil. With a view to achieving this end, seat height should enable the pupil's feet to rest flat on the floor and also support sufficient weight to relieve pressure on the underside on the thigh at the front of the seat. In the second place, it should be chosen for its comfort, durability and contribution to good posture. Its colour should be selected on the basis of attractiveness and cheerfulness. In the third place, the changing programme will need change of the position of the furniture occasionally. Tables, chairs and desks should, therefore, be light in weight and instead of being fixed to the floor should be movable. This would enable them to be grouped together in different positions and thus permit small groups in their work in a corner of their own. It should also be possible to place them on the side of the walls so that the central place becomes available for craft work or for conduct of meetings. No school should have any furniture that cannot be put to regular use.

### **Single *versus* Multi-storey Buildings :**

School buildings should have only one storey because one-storey buildings, if properly planned, will be much more functional than multi-storey buildings. They will permit use of the corridor and the adjacent outdoor space being made as integral parts of instructional space on a full-time basis—an advantage which cannot be had in any building having more than one storey. Moreover, in case of one-storey buildings, it is possible to have temporary shelters to start with which could gradually be replaced with permanent structures. Keeping in mind the requirements of the activity type teaching and the advantage of building by stages, the one-storey buildings are decidedly better than multi-storey buildings.

### **Multi-use of Space :**

Since the need for school facilities is so great and the funds so limited, it is essential that only such buildings should be built as are designed for full-time use. We cannot afford to provide a verandah that is used only for circulation purposes, build a canteen that is used during the recess interval, or provide an assembly hall which is used only for the morning assembly or for some special cultural celebrations. Every room that is designed should be designed for full-time use. If we look at the schools of today we find that a high percentage of the cost is for space and facilities that have very limited use. This leads to wasteful extravagance and, in the interest of economy and efficiency, should not be tolerated.

### Doors and Windows :

Every classroom has to have doors and windows—the function of doors is for purposes of entrance and exit and of windows for adequate light and ventilation. But this is not entirely so. Doors and windows are of great importance to coordinate indoor and outdoor spaces and also to add beauty to the classroom atmosphere.

The masonry opening for doors should generally be  $6\frac{1}{2}$  ft. by  $3\frac{1}{2}$  ft. Their positioning would depend mainly on the size and shape of the classroom. It is desirable to have two doors for each classroom—one in front and the other on the back or on one side so that the pupils may have easy access to the outdoor teaching space attached to the classroom. All doors and windows should open outside and flush against the walls avoiding any projection or hindrance off space.

The main purpose of windows is to provide ventilation and proper lighting which should avoid glare. The total maximum area of windows including fixed fan-lights should be about 20 per cent. of the area of the classroom. The fan-light should be provided only above those windows which are on the side opposite to the corridor side. The window sill level should be 3 ft. above the floor in the case of schools provided with benches or some other sitting accommodation and 2 ft. in the case of the schools where pupils squat on the floor. This would ensure proper cross-ventilation, good lighting and also achieve the ideal of brightness balance.

### Lighting :

The lighting of the instructional space is extremely important. Recent researches in this field have indeed put school planning on a scientific basis. Psychologists laid the foundation for this when they found that the average person acquired about four-fifths of his knowledge through his sense of sight. Medical research proved that the seeing process consumed so much of a person's nervous energy that many chronic ailments actually were caused by people working under uncomfortable eye-fatiguing conditions. They found, furthermore, that these troubles often vanished when comfortable seeing conditions were provided. Teachers themselves in controlled tests in classrooms found that children were more responsive, better behaved, learned faster and were more efficient when working under good seeing conditions than in poorly lighted classrooms. Good lighting, therefore, is a major requirement of the modern school.

Some of the important ways in which lighting encourages and promotes learning through its contribution to the visual aspect of the environment are as follows :—

- (i) It reduces physical tensions. The elimination of glare and the provision of a balance of brightness result in more speed, accuracy and comfort in seeing school room tasks and carrying them out. It also eliminates dark corners and thus provides more elbow room.

- (ii) It conserves physical energy. Good school lighting lessens the expenditure of energy required for students and teachers to carry on normal classroom tasks. Fatigue, restlessness and inattention of teachers and students are reduced and energy is conserved for normal and vital tasks.
- (iii) It creates a cheerful atmosphere. A well-designed lighting system enhances the feeling of warmth and brightness and creates a cheerful atmosphere for work. This psychological factor is sometimes used as a justification for burning electric lights on a dreary day, even though daylight intensities are mechanically adequate for seeing.
- (iv) It contributes to safety. The incidence of accidents in corridors, on stairs, around machinery and elsewhere in the school is greatly reduced when special attention is given to the elimination of danger areas through proper lighting.
- (v) It helps pupils with subnormal vision. Better lighting has been found to improve the prolonged visual performance of people with below standard vision even more than it does with that of people with normal vision. This factor becomes very significant when we realize that the vision of approximately one fourth of the pupils in the elementary schools is below standard.

In the past, the foot candle was the usual measure of lighting efficiency. But nowadays it is calculated in terms of *brightness* and *brightness relationships*. It is not the *amount* of light falling on a task that determines the effectiveness of a lighting system but it is the direct brightness of light sources and the reflected brightness of all the surfaces inside and outside the room that will determine its effectiveness. Brightness and not foot candles alone thus becomes the major factor to be measured and evaluated and the basic problem in establishing and maintaining satisfactory visual environment for school rooms, therefore, is to create and maintain a proper balance of brightness between the brightness of the task (say, an open book or an exercise book) and all the high and low brightnesses of other surfaces visible to the pupil.

There is another factor to be borne in mind in the lighting of classrooms. In case of formal teaching, the whole class sits in rows facing in the same direction—lighting, therefore, has to be comfortable from one particular point of view. In the case of activity teaching, however, there is an increasing tendency to work in small groups and face in different directions. It is, therefore, important to see that lighting is comfortable from any point of view and should produce a uniform distribution of shadow-free and glare-free illumination and maintain an acceptable brightness balance. The longer school day and the greater evening use of school buildings require

the provision of artificial lighting in our schools. This should be carefully planned and provided for keeping in mind the fact that the work in these spaces will at times be three dimensional work.

#### **Ventilation:**

Another important factor which contributes to the quality of work in the classroom is its ventilation. Its main purpose is to replace the stale air of a room by fresh air from outside and thus ensure a constant supply of fresh air passing through the room in such a way that its speed and temperature are conducive to bodily comfort.

As such, ventilation helps a lot in controlling the thermal environment in the classroom which has an important bearing on the ability of the students to learn. It is true that the human body can adjust itself to a wide variety of environmental conditions but it cannot do so without effort and it is the spending of energy in this adjustment which distracts the students in an uncomfortable environment. The various environmental factors which influence body comfort by affecting the temperature at which a body is able to lose heat are: (i) air temperature, (ii) radiant temperature, (iii) relative humidity, (iv) air motion and (v) atmospheric contaminants e.g., odour, dust and dirt etc. In order to provide an adequate thermal environment we must control as many of these environmental or related factors as possible and ventilation is an important means of doing so.

The importance of ventilation is thus generally recognised but the most effective and economical ways of accomplishing it are not always appreciated. As we in our schools have in most of the cases to depend on natural means of ventilation, and not on the mechanical means, the importance of appreciating and utilising the most effective and economical means of ventilation becomes immense. Some of the recent studies carried out by the Texas Engineering Experiment Station in the United States of America are very useful in this connection. These studies have shown that room heights are of much less importance to human comfort than the phasing of openings in sections. They have also shown that a greater breeze induction is achieved if the larger openings are to leeward side and smaller one to windward side. Similarly, better conditions result from a number of well-distributed openings than from one large opening and the areas of inlets and outlets could be slightly reduced by putting the inlets at a lower level than the outlets. It will also be worthwhile to mention here that at one time it was considered necessary to provide 30 cubic feet of fresh air per minute for each pupil in a classroom. But recent investigations have proved it to be worthwhile to mention here that at one time it was considered enough. It should also be borne in mind that in hot humid climate, it is not merely cross ventilation that is helpful but air movement across the body.

Proper orientation of the building on the site is also of great importance in the achievement of good ventilation. The old

practice of orienting buildings to streets should definitely be discontinued and the buildings should be so orientated and designed as to minimise undesirable climatic factors and control these factors imaginatively and intelligently to the point that they help to bring about good ventilation. In this connection, the planting of different kinds of trees and shrubs will greatly assist the planners because trees can be used not only for ornamental purposes but also for shade, breeze induction and cooling by transpiration.

### **Blackboard :**

Every classroom should have a blackboard because it is one of the most useful and inexpensive visual aids that a teacher can make use of. Blackboards are sometimes called chalkboards for the reason that in many cases, they are no longer black but may be red, green, brown, or of any other dark colour. According to one of the researches, light green is considered as the most effective colour because it furnishes a strong contrast with the white markings and provides maximum visibility from any part of the room. It is also entirely glare-free and reduces eye-strain. The change in colour of the blackboard is a part of the attempt to improve the lighting effect on students. For good and proper lighting it is important to eliminate all black (or very dark) surfaces and all white (or very light) surfaces. Incidentally, white may be used on the ceiling but it is desirable not to use it on walls. A blackboard of approximately 4 ft. × 8 ft. on front wall is generally adequate for teacher's needs and it should be placed at a height of  $2\frac{1}{2}$  ft. from the floor. Space should be provided near the chalkboard for placing chalk sticks and duster and there should be a projection underneath the chalkboard to collect chalk dust.

### **Bulletin Board :**

Each classroom should have a bulletin board also. It is a sort of display board for exhibiting pictures, drawings, stories, poems, articles and other relevant material for use by and with the pupils and also for stimulating interest in extra reading. It should not be expensive and should be made from local material such as bamboo sticks, mats, cardboard etc.

It should be located at a well-lighted place easily accessible to pupils and should be put up at a height corresponding to the eye level of the pupils.

The municipal regulations of the city of Bombay require that "every classroom shall have two picture rails running at least on three sides of the classroom. The space between these picture rails shall be filled with cellotex soft board to enable the pinning of pictures on the wall space". This is a commendable requirement and we suggest that it should be adopted by all school authorities. It will be very useful in motivating instruction and consequently raise the standard of work.

In addition to the bulletin board for each classroom, there should be one for the school as a whole also. Its purpose will be to display news, photographs, book titles, information about games, competitions and such other material as is of general interest to the entire population of the school.

### **Playgrounds:**

In the activity methods of teaching, more emphasis is placed on the all-round development of each child instead of emphasising the academic aspect only. Moreover, it is becoming generally acknowledged that many of the essential lessons can best be developed and learned through play. Habits, attitudes and character development cannot be influenced much in the formal classroom environment but are acquired best and most effectively through informal outdoor activities and games. As a result of these considerations, the importance of playgrounds is being increasingly realised.

Careful planning of playgrounds, therefore, is essential to meet the needs of a modern programme of education. In some cases, the consideration of playground needs is postponed until after the school site has been selected and the building put up. It is certainly a wrong approach to the whole problem. The site for the building and the playgrounds should be planned as an unit and not separately.

In planning playing fields, such activity areas which require constant supervision should be located near a central point of control and those requiring less supervision may be farther away. Similarly, such areas as have close relationship or are used by the same age groups should be placed close to one another. The possibility of developing community recreation areas as a part of the school site should also be explored.

The size of the playground will be determined by the needs of the particular programme. But space requirements in this connection are, generally speaking, grossly under-estimated. In many communities, schools are constructed on sites near parks and the school and the community supplement each other for the enrichment of each other's programmes.

Every playground should have a place for outdoor assemblies. Dance and rhythmic activities are as important features of playground facilities as are music and dramatics. Not only are they important in the school programme but they also play a very important part in the recreational programme of the community. Planning for playgrounds, therefore, should proceed together with the planning for the building. It is only this planning that will lead to a truly functional school plant.

### **Fencing :**

The modern programme of education, as has been explained time and again, combines indoor work with outdoor work and

emphasizes "doing" rather than "listening." It will, therefore, be in the fitness of things if the entire school compound has some kind of fence around it to demarcate its boundaries and keep cattle and intruders away. In case of gardening areas, provision of the fence will immensely increase the life of flowers and vegetables, plants and shrubs growing on the premises of the school. This fence should be free from barbs and sharp points within the reach of children and should invariably have a hedge or bushes growing with it. Besides its utility, it will add to the beauty of the compound.

#### **Community Use :**

The school belongs to the community and is a part of it. It cannot, therefore, be isolated from the community and utilised to serve only one purpose—meeting the needs of children. As such, it has to extend its programme and sphere of influence and cater to the educational, cultural and recreational needs of the community also. The school should, therefore, be made available for wider use to the community at all hours and on all days excepting when it is needed for children. This will enable the school and the society to work hand in hand—each one working for the progress of the other.

This tendency to convert a school into a community school is visible all over the world and consequently the future is expected to witness an increasing expansion of the community utilisation of school buildings and its facilities. Before planning a school, therefore, it is essential to consider the needs of the community, make adequate provision for them in the master plan and secure the co-operation of all the agencies involved in it.

Planning a school to care for the community activities should not mean any increase in the building area. Rooms meant for the use of the children during the day should be used by adults at other hours. Duplication of space should be avoided and its multiple use encouraged. Multiple use of space and the available facilities will lead to a good deal of economy.

#### **Teachers' Quarters :**

There are some people who think that the top priority in the facilities of education should be given to the school building. This is not so. "The school", as the Prime Minister has observed in one place, "revolves round the teacher and not round the building". This is certainly so because the teacher is the most important single factor in the whole process of education.

As a result of this, special attention is being paid to raising the status of the teacher in society and giving him enough facilities to do his job in the best possible manner. One of the ways of achieving this end is to provide houses for teachers to enable them to stay on the premises. This suggestion is very far-reaching because it would

(i) solve housing problem for them, (ii) raise their status in society, (iii) enable them to look after the school and the welfare of children throughout the day instead of the usual four or five hours, and (iv) give them opportunities to develop the school into a community centre. The Prime Minister has even gone to the extent of saying : "It seems to me more important to have a proper house for the teacher than to put up a building for the school".

The necessity of teachers' houses, therefore, cannot be over-emphasised. Lack of houses for teachers has been a great handicap in the development of education in rural areas. In case of girls' education especially, it has proved a great hurdle. Realizing this obstacle the Government of India has formulated a scheme to give grants to State Governments for construction of houses for women teachers. We suggest that this scheme may be extended so as to include all teachers—men as well as women. The acceptance of this suggestion will meet a long-felt need of teachers, will bring about contentment to them and increase their efficiency.

At the various seminars, it was suggested that a teacher's house should have at least two rooms of not less than 120 sq. ft. each with a kitchen, sanitary facilities, verandah and some open space for a kitchen garden. Though it was thought essential to provide quarters for all the members of the staff yet it was considered desirable, taking into consideration the prevailing circumstances, to provide such accommodation for 50 per cent of the staff for the time being—preference being given to women teachers and teachers of Basic schools.



## CHAPTER VII

### EFFECTING ECONOMIES

In Chapter IV, it was stated that economy is an essential characteristic of a good school plant and that a school plant should be economical not only in original cost but also in its upkeep and operation. Economy is certainly a great virtue and all efforts should be made to achieve maximum utility out of minimum expenditure. But school planners do not regard economy as an independent problem. They look upon it as one of the factors in combination with two other factors—education and environment—and try to achieve a trilateral balance between the three E's of school planning—education, environment, economy.

This means that economies are not to be effected just for the sake of effecting them. They must be considered from the point of facilitating education and if they meet this objective, they are desirable, otherwise not. As an illustration of this, such measures of effecting economy as reduction in square footage per pupil, cheaper specifications, less amenities and smaller sites are false measures of economy and have consequently to be discouraged. Reduction in square footage is not advisable in view of the fact that the future requirements of our schools are bound to involve much more of activity and craft work than at present. Cheaper specifications would also add to the maintenance charges in addition to decreasing their life and, consequently, increasing the depreciation thereon. Unless the depreciation is low and the building is durable, it would not be economical to construct it. Similarly, lowering the standards of amenities or decreasing the area of sites would affect educational efficiency adversely. Our objective, therefore, should be to achieve economy without sacrificing anything necessary to the educational programme.

In effecting economies, therefore, such approaches should be adopted as will not only cut down the cost of school buildings but at the same time provide adequate space and facilities for the changing programme of education and its techniques. The various factors that would facilitate this aim are indicated below :—

- (1) Selection of an architect,
- (2) Proper selection of site,
- (3) Design of building,
- (4) Building by stages,
- (5) Use of indigenous and local materials,
- (6) Design and specification of building to suit the locally available materials,

- (7) Maximum and optimum use of space for varied activities, and
- (8) The agency and mode of construction.

### (1) Selection of an Architect

One of the most important choices which an agency building a school has to make, when planning a building programme, is that of selecting an architect. Best professional services in this field should be secured. This is so because proper selection of the architect will be one assurance that a school building will be economical as well as adequate.

The architect should be creative and not afraid to depart from conventional forms. He should be able to work within the budgeted amount. Besides, he should be a person who can and will work with ideas suggested by all those who are concerned with the building in any way.

### (2) Proper Selection of Site

Acquisition of sites in villages is generally not a costly proposition. In most of the cases, villagers may even be persuaded to contribute the requisite site for the well-being of the community. The site should be adequate not only for the present needs of the school, but also for all possible future development thereof. It should be easily accessible and within walking distance not only of the children, but also of the general public for community use. It should also be fairly level so that the cost of levelling up etc., is reduced. It should have good soil so that the foundation problems are not created. Drinking water should be readily available on the site. It should also be fairly high and sloping away from the building in all directions as far as possible to avoid water-logging problems. It may not be possible to get an ideal combination of all these factors in each case but the best among all the sites available should be selected. It will be advisable to select the site by a committee consisting of an educationist, an engineer, an architect and, if possible, an official of the revenue department.

### (3) Design of Building

A good deal of economy in construction can be effected through proper designing. It should be as compact as practicable and all unnecessary embellishments, decorations and paddings should be left out. The perimeter should be shortened by keeping the outside walls plain and straight with as few corners and breaks as possible. Perimeters that cut in and out rarely add to anything except the cost of the building and each foot cut from the building's perimeter will represent significant savings. The cubage should also be cut down and the height of the ceiling will be an important consideration in this respect. At one time, rooms as high as 14 or 15 feet were very common. But recent researches have shown the futility

of going as high as that. It is now realised that a room having a height of about 10 feet or so, if properly ventilated, would be comfortable.

Moreover, simple and feasible forms of construction should only be adopted so that they could be easily executed with available labour. Design should be on units. All unnecessary decorations and fancy details should be avoided. In fact, any decoration that is there, should originate from the basic needs of the design and should be integral. This is so because our consideration is functional utility combined with beauty and beauty is found in honesty of structure and simplicity of form.

#### **(4) Building by Stages**

It is not necessary, and in most of the cases may not be possible, to build the entire school building at one stretch. Most school buildings are not completed at the end of the first phase of construction. In our discussion of the nucleus approach,<sup>1</sup> we have made out a strong case for providing the minimum essential building accommodation to start with and developing it by stages. In such cases, the initial structure should be planned and designed in terms of the ultimate school plant and all preliminary plans and drawings should show future building extensions. In order that buildings may be expanded without undue expense the following should be observed in planning and designing a new building in terms of later additions :—

- (i) Do not locate essential windows in walls against which future additions are likely to be built.
- (ii) Locate entrances so that they will not be eliminated by additions.
- (iii) If the site permits, use the one storey single corridor type of plan.
- (iv) Place stairs, if needed, in separate enclosures at right angles to corridors, thus making them fire-resistant.
- (v) Design the building so that suitable connections may be made without circulation bottle-necks.
- (vi) Use skeleton and light type construction. Walls can be easily altered when the weight of the building is carried on the skeleton frame.

#### **(5) Use of Indigenous and Local Materials**

Very great economy in construction costs can be effected by the use of indigenous and locally available materials. There is a wide variety of building materials available in our country and if proper materials are chosen, they would not only facilitate the construction but also reduce the cost. In some places, for example, teakwood

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<sup>1</sup>Please see Chapter VIII.

door frames would be cheaper than concrete door frames. In Rajasthan, however, concrete door frames are cheaper than stone or teakwood frames. Examples of this type could be multiplied. This is why a careful study of the local material and costs thereof is very important for purposes of effecting economies in construction. In the following paragraphs we mention some of the indigenous building materials used in some of the States and desirable specifications thereof.

## ANDHRA PRADESH

### Foundation Materials :

Stone metal, bricks burnt, clay mortar, lime mortar, cement mortar, granite stone, sand stone, Cudappah stone, Shahbad stone (Napa stone).

### Superstructure :

Bricks burnt, bricks sun-dried, granite stone, sand stone, Cudappah stone, Shahbad stone (Napa stone), clay mortar, lime mortar, cement mortar.

### Wood Work (for doors, windows and roofs) :

Country wood (like Nallamaddi), country teakwood.

### Roofing :

Mangalore tiled roof with or without flat tiles, Madras terrace, Cudappah terrace, Hyderabad terrace, asbestos sheet roofing, G.I. sheet roofing, thatched roofing, pan tiled roofing with or without flat tiles, R..C.C. roofing.

### Flooring :

- (1) Rough Shahbad stone 1" thick to 2" thick laid over 3 to 4" lime concrete or cement concrete.
- (2) Polished Shahbad stone 1" thick to 2" thick laid over 3 to 4" lime concrete or cement concrete.
- (3) Rough Cudappah stone 1½ to 2" thick laid over 3 to 4" lime concrete or cement concrete.
- (4) Polished Cudappah stone 1½ to 2" thick laid over 3 to 4" lime concrete or cement concrete.
- (5) 3" to 4" cement concrete 1 : 5 : 10 with granolithic finish ¾" to 1" at top.
- (6) 3" to 4" cement concrete 1 : 5 : 10 with top finished with ½" cement mortar or finished smooth.
- (7) The bottom lime concrete or cement concrete is substituted by brick jelly concrete.

### Finishing Items :

Lime plaster, cement plaster, wood oiling, painting, lime pointing or cement pointing to stone masonry.

## MADRAS

### Foundation Materials :

Bricks, stones, clay, lime and cement mortar ; brick jelly concrete, broken stone metal etc., brick in clay, lime or cement mortar; roughstone, dry-packing, roughstone in clay, lime or cement mortar.

### Superstructure :

Mudwalls, dried bricks in clay, brick or roughstone in clay, lime or cement mortar.

### Wood Work :

Seasoned country wood like Pillamarudu, Karimarudu, Margosa etc. for doors, windows, rack and almirah shelves. For window bars, use wooden bars; for doors and window shutters, cheaper flattened drum sheets attractively painted to be provided.

### Roofing :

Roofing with bamboo and thatched materials like Palmyrah, cocconut leaves, straw etc. Mangalore tiles, pan tiles, flat tiles on country wood common rafters and reepers on kingpost truss of seasoned country wood. Where wood and bricks are available, Madras terraced roofing with Palmyrah or country wood joists according to the availability.

### Finish :

Mud mortar, lime mortar, cement mortar and floor finish with brick jelly concrete of 3" thick and plaster over.

## MYSORE

### Foundations :

Stone is available practically throughout the State of Mysore and stone in mud can conveniently be used for foundations. Wherever the soil has good load bearing capacity, the concreting of the foundations for the cheap buildings under contemplation can be avoided.

### Superstructure :

Brick in mud or mud walls can be used in Maidan areas ; in Malanad areas where halenite is available *i.e.* Shimoga and North-Canara district), halenite bricks can be used both for foundation and superstructure. In coastal areas and Malanad areas, where the rainfall is heavy, it becomes necessary to use cement mortar, or lime mortar as cementing material.

### Roofing :

In Maidan districts of Mysore, Mangalore tiles and pot tiles can be conveniently used over jungle wood rafting or Casuarina rafter.

In Mysore district, pot tiles over bamboos are very commonly used. For appearance purposes if country tiles have to be discarded then asbestos cement sheets over country rafters are adopted. In Semi-Malanad areas, thatched roofing is used with advantage.

#### Doors and Windows :

Matti wood frames and jungle wood shutters.

#### Flooring :

Lime concrete 3 and  $1\frac{1}{2}$  cement concrete and cement plastered over.

#### N.E.F.A. AND PARTS OF ASSAM

##### Foundations :

- (a) *Ordinary Basha Type construction*  
Jungle wood or bamboo posts, just embedded in ground, after having been treated with a coat of wood-oil or wrapped round with plain tin sheet.
- (b) *Hill Type construction*  
Stone or cement concrete pillars.
- (c) *Semi-permanent Type construction*  
Cement concrete pillars with cement concrete pardi walls up to plinth.

##### Walling :

- (a) *Ordinary Basha Type construction*
  - (1) Single tarza walling mud plastered.
  - (2) Double tarza walling.
  - (3) Jungle wood weather boarding, dao-dressed.
- (b) *Hill Type construction*
  - (1) Ekra walling, cement plastered up to door height and mud plastered above.
  - (2) Split bamboo walling, cement plastered up to door height and mud plastered above.
  - (3) Sawn plant walling or weather boarding.
- (c) *Semi-permanent Type construction*  
Same as for hill type construction or random stone masonry where stone is available.

##### Flooring :

- (a) (1) Raised earthen floor with one layer of *chattai* matting on top.

(2) Raised *chang* floor about 3 to 4 ft. above ground with half bamboo placed on bamboo or jungle wood floor beams and joists.

(3) Jungle wood plank flooring, dao-dressed.

(b) *Hill Type construction*

Sawn plank flooring over sawn timber floor beams and joists.

(c) *Semi-permanent Type construction*

1½" cement concrete 1 : 2 : 4 flooring over 3" thick cement concrete bed over 6" sand filling.

**Roofing :**

(a) *Ordinary Basha Type* (sloped roof with jungle wood or bamboo trusses).

(1) Thatch or Takopath roofing 9" thick.

(2) Bamboo *chitra* roofing.

(3) Bamboo channel tiles.

(4) Jungle wood plank roofing dao-dressed.

(b) *Hill Type construction* (sloped roof with sawn timber trusses).

(1) C.G.I. sheet roofing.

(2) Aluminium sheet roofing.

(3) Sawn plank roofing or timber shingling.

(c) *Semi-permanent Type construction*

Same as for Hill type construction.

**Doors and Windows :**

(a) *Ordinary Basha Type construction*

(1) *Jhap* doors and windows.

(2) Jungle wood door and window shutters.

(b) *Hill Type construction*

Hollock or equivalent door and window shutters, 1½" thick for doors and 1¼" for windows.

(c) *Semi-permanent Type construction*

Same as Hill type.

**Life of different types of construction**

(a) Ordinary basha type—3 to 5 years.

(b) Hill type—15 years.

(c) Semi-permanent—20 years.

As regards specifications, the following details would be helpful :—

(1) *Single Turza walling and with mud plaster*

The bamboos are split up and the outer skin of the same are removed so as to soften the fibres. Thereafter these are made flat after removal of knots and fixed vertically and woven with horizontal kamis 1 ft. apart. At top and bottom and in the middle, half bamboo linings, one on each side, are tied to strengthen the wall. Wall is tied against whole bamboo posts fixed about 6 ft. apart and buried 2 ft. below ground. The walling is given  $\frac{1}{2}$ " thick mud plaster on both sides.

(2) *Double Turza wall*

Turza flat pieces are woven both ways either horizontally and vertically or diagonally at 30 to 45 degrees and closely packed. Half bamboo battens are placed at suitable intervals for strengthening.

(3) *Split Bamboo walls with mud or cement plaster 1 : 6*

Bamboo Kamis (long strips split out of bamboo)  $\frac{1}{2}$ " to  $\frac{3}{4}$ " wide dressed and cut into strips of proper length are woven through kamis horizontally or vertically or diagonally to make walls in panels of buildings and then plastered both sides either with  $\frac{1}{2}$ " thick mud plaster or  $\frac{3}{4}$ " thick cement plaster 1 : 6 (1 cement and 6 sand) and white-washed.

(4) *Ekra walling with mud or cement plaster 1 : 6*

Ekra is a kind of reed that grows in marshy land and river breaches. Ekras are placed vertically and slipped into grooves in the middle of wall-battens, cutting them to proper lengths, in panels. In between the panels, Ekras are strengthened by alternate tiers of single and double kamis at about one foot apart vertically. Walls are plastered either with  $\frac{1}{2}$ " thick mud plaster or with  $\frac{3}{4}$ " thick cement plaster 1 : 6.

(5) *Bamboo Chitra roofing*

Four or five layers in single turza are laid in roof over the roof trusses and fixed with purlins by cane or wire.

(6) *Bamboo channel-tiles roof*

This shall be made from hollow bamboos of 4" to 5" diameter. The bamboos are cut to required lengths, split up in halves and the inside knots removed. These are called bamboo channels.

These channels are then placed closely along the roof similar to country tiles with a layer of double turza underneath and fixed with bamboo laths or wires.

Some other useful suggestions in regard to specifications with a view to effecting economies are as follows :—

(i) *Foundations :*

The depth and width of foundations should be properly designed. If need be, the Soil Engineering Section of the Central Building



Research Institute, Roorkee should be approached for obtaining correct dimensions of foundations.

(ii) *Walls :*

In the dry areas, external walls could be 13" thick in combination of pucca brick on the external face and kutcha brick on the internal face (*ghilafi*), with cement plaster/cement pointing on the external face and mud plaster on the internal face. Even sun-dried brick work could be used where the rainfall is less than 15 inches. However, up to a height of 3 ft. from the plinth, burnt brick in mud is recommended with lime/cement plaster up to the same height.

Top two courses of wall below roof, jambs and sills of windows should be in burnt brick.

For hilly regions, it is suggested that external walls may be—

- (a) Hammer dress stone masonry in cement mortar ;
- (b) Hammer dress stone masonry in mud mortar in super-structure above plinth level. The walls should be cement pointed and mud plastered above window sill inside.

(iii) *Internal Partition Walls :*

Where light weight partitions are not possible, internal partition walls should be in burnt brick in mud 9" thick. This will be very useful for sound insulation. In dry areas, sun dried brick-work would be suitable.

(iv) *Roof :*

For plains, roof reinforced concrete battens and tiles with two layers of bitumen, 4" earth and 1" mud plaster is suggested. For urban areas of the plains, where other materials may be readily available, it is suggested that roof should be in reinforced cement concrete. For hilly regions, asbestos cement sheets/slate roof will be useful.

(v) *Ceiling heights :*

Ceiling heights should be as follows :—

|                    |             |
|--------------------|-------------|
| For classroom :    | 11ft.       |
| For verandahs :    | 8 ft.       |
| For Sloping roof : | 9 ft. 6 in. |

(vi) *Flooring :*

Flooring should be of 1½" thick conglomerate over 4½" of lime concrete or 3" cement concrete and 4" of sand.

For hilly regions it is suggested that the floor may be—

- (a) Up to 5000 ft. altitude — 1½" cement concrete flooring laid on a bed of cement concrete.
- (b) Over 5000 ft. altitude — Wooden planks flooring on wooden joists.

(vii) *Damp Proof Course :*

Damp Proof Course in cement concrete should be 1" with two coats of bitumen.

(viii) *Reinforced Cement Concrete lintels :*

In order to economise in the cost of construction and saving in cement and steel it is suggested that for openings over doors and windows wherever possible, brick arches flat|segmental may be provided.

(ix) *Joinery Works :*

- (i) Deodar or Kail could be used for joinery work.
- (ii) For appropriate types of timber, Central Forest Research Institute should be referred and suitable type of timber selected for the joinery work.

(6) *Design and specification of building to suit the locally available materials :*

Once the resources in respect of building materials of a particular place have been studied, the building should be so designed as to suit the materials. The foundations, flooring, superstructure, windows, roofing, finishing materials should all be carefully designed having regard to the materials available. In the case of Government buildings, an effort is made to stick to P.W.D.'s specifications but we feel that evolving of proper specifications deviating from the conventional conservative stipulations would be helpful and lead to considerable saving in cost.

(7) *Maximum and optimum use of space for varied activities :*

The design should be such as will lend itself to a maximum utilization of the space and the facilities provided throughout the day. room which is hardly used for one hour a day or even an auditorium room which is hardly used for one hour a day or even an auditorium to accommodate large crowds on some special occasions in the year are examples of extravagance and not economy. In this respect, there is a great scope of improvement on the existing state of affairs. No covered accommodation should be provided unless its full time use is assured. This aspect of economy has already been discussed in a previous chapter under the head "multi-use of space".

(8) *The Agency and mode of construction :*

The agency and mode of construction should be decentralized as far as possible and should devolve on the local community. If a

spirit of self help could be instilled in the local population, the voluntary contribution would go up and the building costs would be cut down appreciably. The services rendered by the community could be in the form of materials, labour, supervision, workable ideas and so on. Besides effecting economy it would also enthuse the community and enable it to look upon the institution as its own. A number of State Governments have made it a condition that voluntary contribution to a particular extent should be forthcoming before a school building can be put up. We consider this a very healthy and useful condition. Selection of proper time for the construction of a building is also an important factor in determining the extent of voluntary labour available. If work is started at a time when majority of farmers are free from their field work, a good deal of voluntary help would be forthcoming—at other times when they are busy with their own work the extent of voluntary labour will be negligible.

To sum up, we might say that economy is not a simple concept—it is a complex relationship between the initial cost, educational adequacy, and maintenance expenses. The cheapest possible initial cost of a school building can never be a true indication of economy—what really counts is a long-range outlook.

## CHAPTER VIII

### THE NUCLEUS APPROACH

*(Revised Version)*

Within a few months of the initiation of this project a new approach to the solution of the problem of school buildings was evolved and it was presented in a monograph "Schools for All" published by the Ministry of Education. It stressed the importance of economising on school buildings, advocated the idea of utilizing the open air teaching to the maximum and suggested that instead of building a complete school right from the start we should try to build it by stages starting with a functionally designed school room to serve as the "nucleus". Such a nucleus was to provide storage, display and blackboard space along with a work bench while actual teaching was to be carried on in the open or under temporary shelters. Shri K. G. Saiyidain, Educational Adviser to the Government of India, in his foreword to this monograph observed as follows :—

"This small brochure represents an emergency effort to meet an emergency situation. In our country, we are up against the general difficulty of having to match inadequate and meagre resources against stupendous needs. One of these needs is the provision of some kind of buildings for our schools, not only the new schools to be opened but also a large proportion of existing schools which have hardly any buildings worth the name. Even on the most conservative estimate the cost of so many school buildings will be beyond the resources of the nation for many decades. But people are athirst for schooling and their demand for education cannot be denied or postponed. At the same time, democracy postulates the early provision of compulsory Primary education for all children, at least between the ages of 6 and 11. Some emergency measures must, therefore, be devised to enable these millions of children to receive the benefit of some minimum education."

He continued :

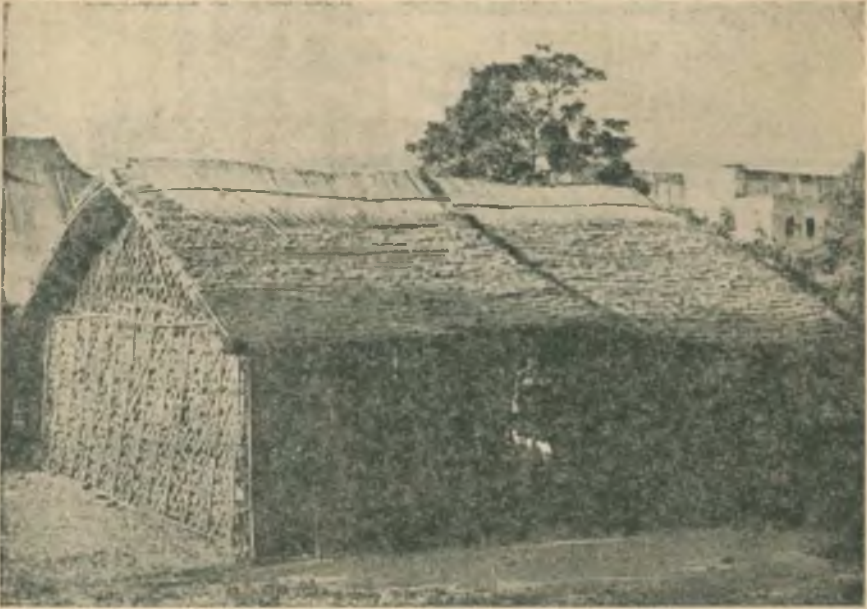
"This brochure does not present a final picture or even a tentative solution of the national problem, nor does it claim to offer anything startlingly new. It is the result of cooperative thinking on the part of many knowledgeable persons at the Centre and in the States and pinpoints the issues involved in their wider educational setting. It is being put out at this stage partly to stimulate widespread thinking on the problem by educational administrators and building experts and partly to elicit their suggestions and criticisms which can be utilized for the improvement of the present scheme."

Accordingly, copies of this monograph were sent out to teachers, headmasters, educationists and educational administrators and they were requested to give their reactions and offer suggestions for improvement. The replies have been very encouraging and what was originally thought to be a mere idea seems to be practical and workable. The fundamental principles that it would lead to economy in expenditure on buildings, provide adequate teaching environment, induce and inspire local effort and make school design flexible have been very much appreciated and applauded. It is, however, doubted in some quarters whether the economy that would result from it could lead to any substantial rise in the emoluments of the teacher. We, however, feel that the savings would go a long way in making schools more functional, giving the teacher better tools and more equipment, and thus making him more efficient. These things by themselves will go a long way in making the teacher work efficiently, lead to better appreciation of his work and thus improve his status in society.

The building of the nucleus by the State Government and leaving the rest of the responsibility to the local effort has also found favour with most of our correspondents. Local participation and local responsibility, they emphasise, will create enthusiasm in the members of the community and this will in turn result in better services to the needs of not only boys and girls of school-going age but of all the people in the neighbourhood.

There are some who have objected to open air teaching and this criticism has come especially from hilly areas and from regions which have plenty of rainfall. In such areas, provision of covered accommodation for all the children is absolutely essential. But in plains, open air teaching should certainly be encouraged. At the Calcutta Seminar, Dr. D. M. Sen, Education Secretary, West Bengal Government, told us that at Shantiniketan, where the annual rainfall is 40 inches, they had experimented on combining open air accommodation with the minimum of covered space and it had been estimated that by working outdoors they lost, on an average, only seven days in a year. This loss is insignificant as compared to the advantages that accrue from it. Even in plains, however, we advocate the putting up of weather controls. But these controls may be temporary rather than permanent with a view to be within our resources at the moment.

In some cases, the question of orientation has been raised. Actually orientation is not a problem at all so far as our suggestions are concerned. When one enjoys the shade of a tree one is not the least concerned about the orientation. Our proposal is to design the schools the same way. Simple and inexpensive weather controls on the three sides of the shelter will give the classroom better ventilation than is possible even in the best of schools. Lighting will also be more adequate. A low wall, possibly 2 ft. high, around the perimeter of the classroom shelter would be desirable. It would



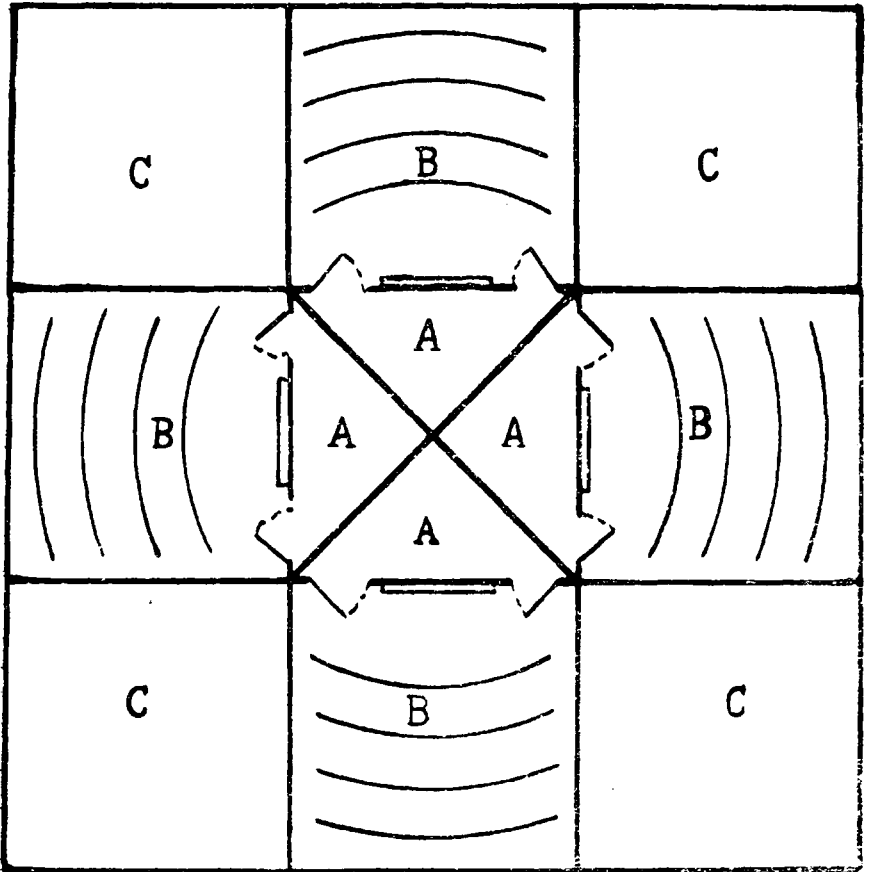
A temporary shelter in a New Delhi school

serve as work space for pupils and it would make it simpler and easier to instal simple weather controls to cope with wind, dust and rain. These weather controls may be frames of bamboo covered of palm leaves or thatched that will close up completely the opening on the sides of classroom shelter. Such frames can be lowered or raised to give the class the most desirable ventilation and lighting.

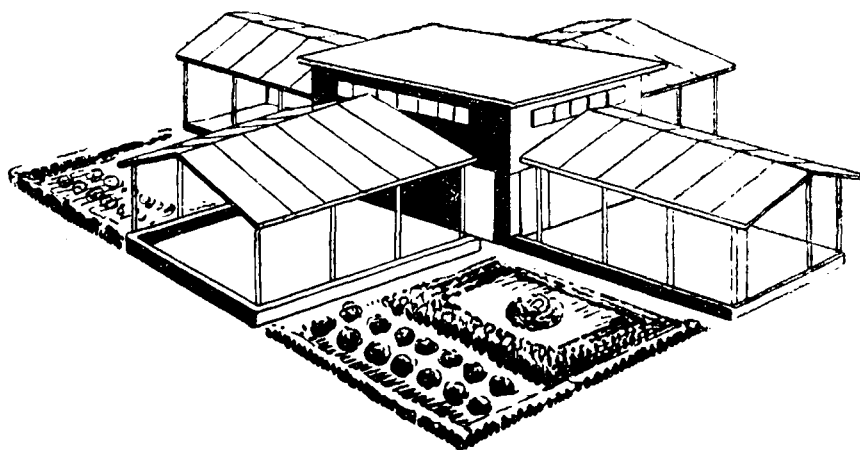
Since classroom shelters will have better ventilation than ordinary classrooms, it will be desirable to have a low roof line. A low roof plus 2 ft. wall will leave only about 5 or 6 feet space to be provided with weather controls. Engineers and architects claim that shelter with such controls will be as adequate as that provided by classrooms in most parts of India.

Another criticism levelled against the original approach is in regard to the shape of the nucleus. The division of a room into triangular areas has been taken exception to. It is true that a triangular area is rather unconventional but as a result of our discussions with engineers and architects it seems to provide the essential facilities for every school with the least amount of money. A number of States have developed plans which are on the lines of the plans set forth in "Schools for All". This plan consisted of building a pucca room of suitable size and partitioning it diagonally into four equal isosceles triangles. Each triangular room so formed will have

two openings on the outside with a chalkboard between them fitted to the wall. A plan of this nucleus is reproduced below :—



- A. *NUCLEUS*—(storage, workbench, display space, blackboard) to be provided with the help of Government.
- B. *SHELTER*—(floor, roof, wind break) to be provided with local effort. Shady trees or canvas or bamboo at first, permanent construction later.
- C. *PLANTING LABORATORY*—Adjacent planting area to be developed entirely by pupils and teachers.

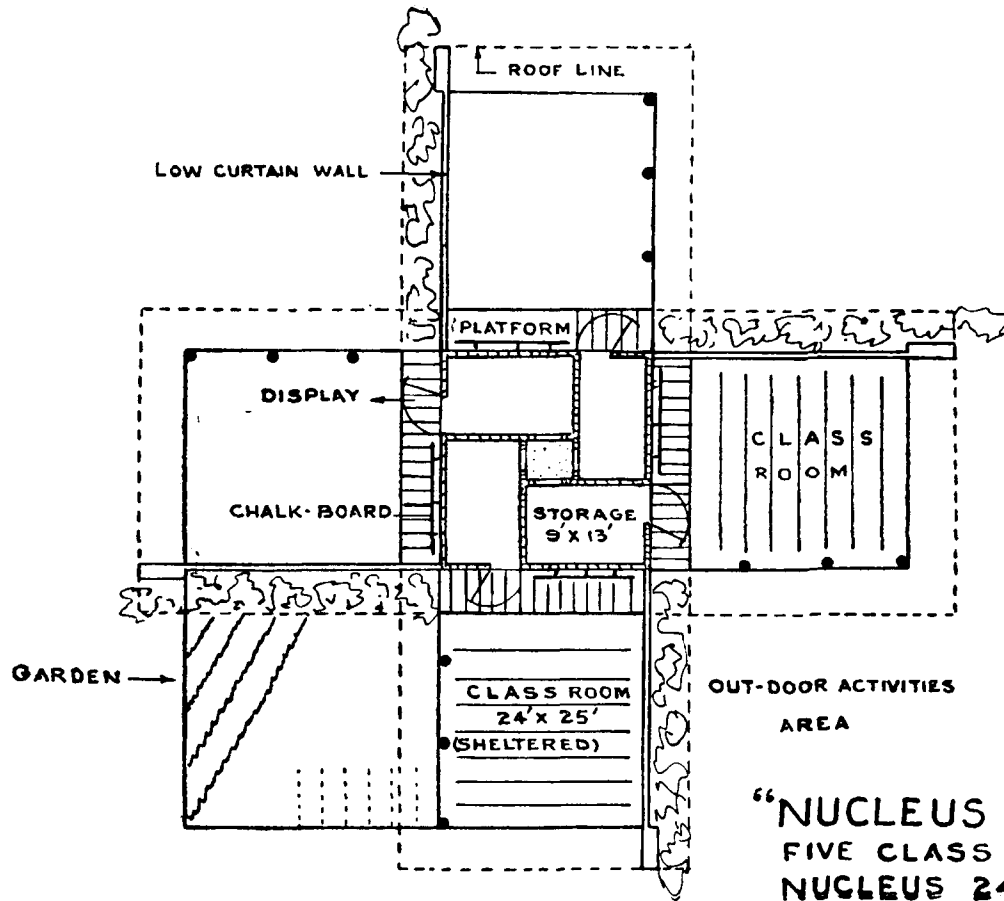


A "Nucleus first" school showing indoor and outdoor work areas

This shape provides adequate provision for storage of equipment, pupils' projects and materials for crafts. There is enough display space on shelves close to doors that can be seen by the class. Provision of display space can also be made on the doors as they open out and it appears to be probably the most inexpensive and compact structure possible. The only disadvantage is that the teacher cannot always see all that goes on inside the nucleus even though the doors may be open.

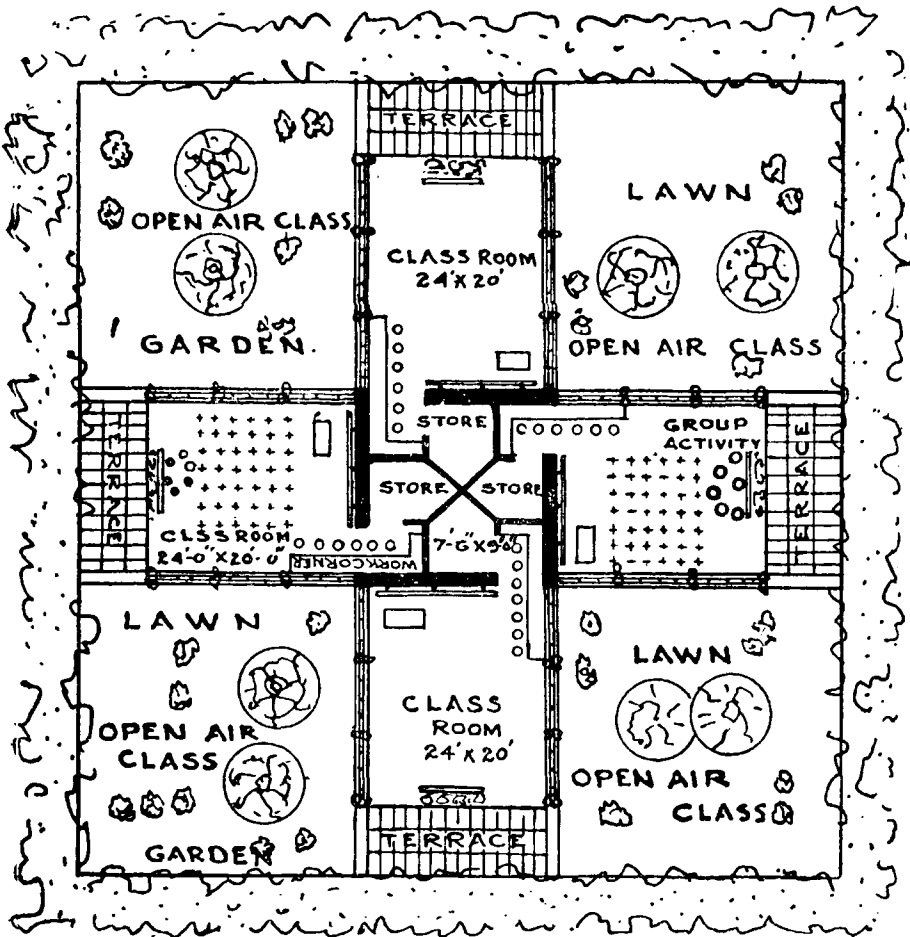
But it is not necessary to have a triangular shape only for the purpose. The following plan shows a room 24 ft. x 24 ft. divided into four rectangular areas of 9 ft. x 13 ft. each and another uncovered rectangle in the centre. The size of each unit is adequate for our requirements and it also ensures good light and ventilation.





"NUCLEUS FIRST"  
 FIVE CLASS SCHOOL  
 NUCLEUS 24'X24'

One more design in this connection is reproduced below. It is from the State of Madras.



PLAN  
VILLAGE SCHOOL

These plans do not present the last word in the design of the nucleus. Many more variations are possible and some of them may be seen in Appendix VI on "Model Plans".

The question of providing two doors has also been raised. One door is said to be enough. We have suggested two doors in order to increase display area and provide easy access to the enclosed space. As the nucleus is not only to provide storage space but also a work-bench, it will be necessary for a number of pupils to go in and come out.

It has also been suggested that the nucleus instead of being divided into four areas should remain as it is and cater to the requirements of four classes. In our opinion, dividing the nucleus into units is essential. It will not only reduce class distraction to the minimum but also provide a psychological advantage in enabling each group to look upon a part of the nucleus as its own. Besides, the nucleus is not meant to cater to the requirements of classes only. It has also to meet other demands as lunch room, health room, library and community needs. We feel that out of four areas, at least one should be reserved for these requirements. In case of a full-fledged Junior Basic School of five classes, therefore, we visualize that not one nucleus but two would be needed to meet all educational requirements.

Finally, in suggesting the nucleus approach and repeating it here, we were trying to tackle two main problems. They are: (i) to provide school accommodation for those not now in school; and (ii) to replace existing inadequate facilities with facilities that will permit of introduction of activity type teaching and meet the needs and requirements of the changing programme of education.

These two problems together involve a very high percentage of the total number of school-going population in this country and, as things are, any programme to finance them in the immediate future seems to be rather remote. There is no doubt that education will have to be given a much greater percentage of the total Government budget in the coming years than in the past but still it will not be enough to meet the problem as it should. In many countries, such large undertakings were financed by long term loans spread over say 30 to 40 years. Such a loan programme would certainly present a suitable and adequate answer to the school building needs.

If it is impossible to provide a loan programme and spread the payment thereof over a good many years then the question we are faced with is: Should we build expensive schools for a limited number of pupils and thus deprive millions of children of any education whatsoever or should we plan schools for all and start such schools now but build only a very limited portion of each and continue with the construction of the complete good quality school by stages as money becomes available?

In our opinion, bearing in mind the limited funds available, the latter alternative appears to be the only solution. This is why the

nucleus approach has been suggested. It is not recommended as an ideal solution but it has to be considered seriously if educational facilities have to be extended to millions of children not at school. As it was stated in *Schools for All*, "When the choice is between a big cake for some and no cake for others, a democratic Government has perforce to decide in favour of a small cake for everybody." If people become interested, they will speed up the construction of the whole school by stages and in record time. If interest lags, the complete programme will take more time. In either case, however, there will be *schools available for all and right from now onwards*.

The final suggestion, therefore, boils down to accepting the nucleus approach and determining the priorities for the purpose. Determining of priorities, however, should be done not by engineers or architects but by educators. The total needs of the new type school should be analysed, these needs should then be ranked in importance and the available funds must be used for items having the highest priority.

When this is done, the problem will be to plan a complete school and provide those items first and as much of the rest as funds will permit. The nucleus approach to planning is simply a suggestion to group together all phases that have a high priority and make certain that original construction provides for them. All other items are to be provided as funds become available.

The approach suggested in this chapter has been discussed at our seminars and examined carefully by architects and engineers but it has not yet been tried out in brick and mortar. As such we do not advocate its wholesale adoption straight away but recommend trying it out on a limited scale before applying it more generally. It comes not as a counsel of despair but as a practical and workable solution that merits serious consideration at the hands of those interested in the welfare of the country.

## CHAPTER IX

### NEEDED RESEARCH

Some suggestions have been offered in the previous chapters in regard to 'Planning of Schools' and some model plans are also being given in Appendix VI. The idea of these suggestions or plans is not to advocate repetitive construction of identical structures and do away with any further planning of school buildings. Their purpose is to give some ideas to the planners and also some good and standard solutions to them with a view to effecting economies in time and costs. Instead of letting each planner design and fit his own dress to his peculiar pleasure, they suggest standardisation of parts and procedures on the same basis as we accept the principles and practice of modular co-ordination. All that has been said in this Report, therefore, is just suggestive and not at all prescriptive. Furthermore, even the suggestions in most of the cases have been made on general consensus of opinion and not on many objective studies.

In view of the non-existence of much objective data on the planning of schools, there is a great need for a nation-wide programme of research in school planning. It should, however, be noted that no single agency by itself can solve the many problems that affect the health and achievement of our children and the efficiency of our teachers. Many Government services (education, public works, finance, planning, etc.) besides many non-government agencies, will have to give their assistance in this important matter. Moreover, until more research is done in this field a high percentage of money now spent for schools will be wasted because poorly planned and consequently inadequate facilities have a short useful life and as a result are very costly on a cost-per-pupil-per-year basis.

There are many questions which have not yet been answered and they require further study and research. A short list of such topics is given below in the hope that answers to the questions raised will be forthcoming soon :—

(1) *Trends in Class Size* : We have made some suggestions in this connection in the previous pages but they are not enough. It is for us to consider if we can profit by the experience of other countries that have introduced compulsory education. Most of them practically disregarded limits on class size until all children were in school. If this policy were to be introduced in our country it may mean that for many years to come the classrooms that we now plan and build may have to accommodate many many more than current practice dictates. The question therefore which needs a careful investigation is : To accomplish compulsory education for all, what is a reasonable class size based on reality rather than *idealism* that we should use as a basis for planning ?

(2) *Space needs for Activity Programme* : Basic education has been accepted as the pattern of education in our country. It emphasises activity and learning by doing. Judging by such innovations in teaching, is it safe to predict that basic education and activity type teaching will require more and more space? How much space will be needed and what type of building plans will have the flexibility to cope with this problem properly?

(3) *Economical School Size* : The scope of school programme is fast expanding and it includes provision of lunches, clinics, visual aids and so many other things. Can a small school afford to provide all the equipment and facilities needed for better methods of teaching? These same costs if spread over more pupils are much less costly. This factor alone is causing small schools in many countries to disappear even though for other reasons the people generally would prefer to keep their own small schools closer to home. A most important question, therefore, to ask is : What is an economical school size? Answer to this question at the present time from various parts of India range all the way from 200 pupils to well over 1,000. But what is the most economical size has yet to be decided.

(4) *Display Space* : How much and what kind of display space is needed is another question which needs attention. It cannot be denied that recognition of good work is a stimulant for greater effort. As such, display of good work of some pupils can effectively be used as a means of motivation to better efforts. Besides, visual aids of all descriptions will be used in teaching and space has to be provided for all of them. But how much?

(5) *Storage Space* : How much and what kind of storage space is needed for the changing school programme? The activity programme and better methods of teaching will require more and more storage of projects of pupils and simple tools that they work with. How much equipment and how many visual aids will eventually need storage in the classroom? How much central storage should a school have and how much class storage?

(6) *Out-door and in-door Space* : How much out-door (and open shelter) teaching is possible? Old traditions and strong prejudices have induced thousands of communities to build costly buildings that interfere rather than assist good teaching. How can we overcome the strong prejudices in favour of massive walls suited for ineffective formal teaching only? The out-of-door space offers many opportunities to relate lessons to life. Even in colder climates more and more teaching is carried on out-of-doors. How much advantage has a classroom shelter with simple weather controls over the traditional enclosed room? These are the questions which need further clarification.

(7) *Multi-use Space* : How can we plan a multi-use room that will take care of school lunch, assembly, music, drama, and a great variety of other activities? How can we design all space for multi-

**use during the day and also for additional use after school hours for community use? Should any space be designed for less than full-time use? If so, why and how much?**

(8) *Local Responsibility* : How can we develop more local responsibility in planning, building and operation of schools? Would an increase in local responsibility result in an increase in interest in education? In many countries, such has been the case. Is the District Inspector of Schools the logical person to assist the local community to assume more responsibility? If not, what other agency would you suggest for the purpose?

(9) *Cooperative Planning* : This practice has been sadly ignored in our country. Questions for further enquiry are : How can the educator assume his rightful place in the planning of school? Is it possible to plan functional schools without the help of the educator? What contribution to planning should come from local teachers or headmasters, from district inspectors, from State Department of education, from the community etc. ?

(10) *Construction Agency* : What agency within Government is best suited to plan and build schools? Most countries have found it necessary to establish a school planning and school construction agency within the Department of Education. What implications does the experience of other countries have for us?

(11) *Expediting the Programme* : How can school construction programmes be expedited? How can we achieve better coordination and better cooperation between the different agencies involved in planning and building schools? Would it help to have fewer agencies involved? Which agency should have the final authority on plan approval?

(12) *Flexibility in Design* : How can flexibility in design and construction be achieved to meet the requirements of the rapidly changing educational methods and programme? How can design assist the activity type teaching? How can we design schools that can also cope with the problem of larger numbers? How can we plan schools which will grow by stages?

(13) *Finance* : How should school planning be financed? What part should the community play in it? Should Government funds be limited to the provision of nucleus only? Who should finance a house for the teacher?

(14) *Maintenance Costs* : The cost of maintenance of a building has an important bearing on school construction. A less expensive building may have such a high maintenance cost that in the long run it will be more expensive than a good quality building. What should be the average life of a school building? How can original cost be equated against maintenance costs to find the most economical construction standards?

(15) *Decoration and Colour of School Buildings* : It is now generally accepted that colours have a tremendous influence on people ; this seems to be particularly true in classrooms. What colours are desirable ? What colours should be avoided ?

(16) *Transportation of Pupils* : What are the implications of school transportation services in big cities on location and size of urban schools ? Is the percentage of those transported increasing or decreasing ? What are the reasons for this ? Could this lead to more schools being located near parks and in less congested areas ?

(17) *Sanitary Facilities* : Should sanitary facilities be provided in our schools ? If so, to what extent ? How can a school help raise health and sanitary standards of a village ? What should be the minimum sanitary facilities required in all schools ?

(18) *School Furniture* : To what extent does furniture affect posture and health ? What kind of furniture is best from the teachers' standpoint ? What are desirable standards on height, form, colour etc. ? How can furniture be so planned as to meet individual requirements ?

(19) *Providing Facilities of Drinking Water* : The water supply of a school has many implications for health and sanitation. What is the present status in this respect ? Does it have a high enough priority to make it a responsibility of Government rather than of local control ? What are desirable minimum standards ?

(20) *Community Service* : One of the big problems of the future is : To what extent will the schools have to serve adults ? In every community there are more adults than children. Will the school have to serve them more and more as seems to be a world-wide trend ? If so, how can we plan schools for maximum utilization of facilities for such use ?

(21) *Utilisation of Facilities* : In this respect research needs to be done to revise long established administrative practices that prevent high utilization of facilities. In secondary and higher education specially there is a great need for research on how to achieve maximum utilization of space and equipment. Such research should result in better facilities at greatly reduced cost.

(22) *The Programme* : How much more effective is life-related activity-type teaching than bookish teaching ? What are its requirements ? What kind of facilities does it need ? Educational Research in this field is needed badly. The findings of such research promise to revolutionize school construction.

(23) *Physical Education* : To what extent can attitudes and habits be better developed through physical education on the playground than in the classroom ? How much playground space is required for these ? Such findings could have a profound impact on size of school sites.



(24) *The Teacher*: To what extent should the village teacher become a leader in the village? Where should he live? What community activities should he provide for in the school? If the school is to satisfy many community needs in addition to all regular school needs, it will require much careful planning.

(25) *Teaching Equipment*: To what extent can learning be improved with more equipment, better motivation, and better methods of teaching? What implications does this have on the class-size, double-shift system and better utilization of schools?

The list suggested above is not exhaustive. There are many other problems in the field on which additional information is needed. Studies of the above problems will yield information which will be very helpful in planning schools for the future.

Besides research problems, there is a great need of reference services. We, therefore, suggest that a school planning cell should be set up in each State and a Senior Officer should be in charge of it at the State Headquarters. There should be one such cell at the Union Ministry of Education level also. Even if it is not possible for the officer to conduct actual research, he should be in an ideal position to keep himself up-to-date in his particular assignment and make use of the findings of research studies in this field. He should also be responsible for collection, interpretation and distribution of the findings of the research studies carried on in this country and abroad. It is gratifying to point out in this connection that as a part of this project on "School Planning", T.C.M. has given to each State Government a considerable number of some of the newest and best books on the planning of schools from various countries and they provide a very good nucleus for the setting up of a library on planning of schools. They will not only help the research students but the administrators and other school authorities also. We hope proper use will be made of these books and the enthusiasm and interest that this project has created in the country will bear ample fruit.

## CHAPTER X

### MODEL PLANS

In the previous chapters we have discussed, in some detail, the guide lines for planning our schools and have also indicated some problems for further thinking and research. But what has been said so far has been mostly in general terms and can be useful only if it is applied to specific situations. In view of this we now propose to give some model plans for purposes of illustration. These plans have been selected from a number of plans which were drawn up by the committees set up at the various regional seminars and they show a portion—a very small portion—of the work which has actually been done in the field.

There are some administrators who are very much in favour of type plans for different categories of schools. They feel that if plans are once drawn up after careful thinking and mature consideration, they will solve the problem for a long time, if not for all times. They also advocate them as a means of saving time and money. But this is one side of the picture only. We personally are not in favour of these type plans because they are attempts to solve hypothetical situations which do not exist. We also feel that ready-made solutions are economical only in the narrow sense of the word and not in the broad sense. Moreover, type plans for schools have not worked satisfactorily in those countries where they were tried. The main reason for this is the fact that educational requirements are changing as rapidly as everything else in the world and schools have to be designed very carefully to fit the changing conditions. Besides, type plans will suit only bookish teaching or a regimented type of school programme. For all other methods of teaching the environment is as important as the teacher and consequently deserves very careful consideration. If the school is to have a character reflecting the community, the educational methods, the climatic conditions etc., it shall have to be evolved in each case instead of just being a blueprint of somebody else's efforts.

This brings us to another important point against the type plans. By providing type plans adequate attention cannot be given to local conditions and local materials. Besides, the State control of education will increase at the cost of local initiative and local enterprise. All these factors will affect functional planning adversely.

In view of these important considerations, we are in favour of staying clear of type plans. We believe that each community should solve its building problems individually and each school should be so planned as to meet the specific site and its terrain, the specific educational needs, the specific needs of the community, the specific mate-

rials available in that area and the climatic conditions of the place. Any plan that is designed to fit a variety of situations will not fit any situation. This is why it is always useful to make the plan fit the site than to make the site fit the plan.

The plans presented here\* are therefore, for the purpose of illustrating some of the ideas advocated in the previous pages. They are not to be adopted blindly but any good ideas that they contain have to be adapted to fit our needs. As more and more schools are planned around educational needs, real economy will become evident and type plans will fall into discard as too costly and too inadequate. Each new construction project should, therefore, be looked upon as an opportunity and a challenge to improve school design and construction.

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\*Please see Appendix III for these Plans.

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## APPENDICES

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APPENDIX 1

QUESTIONNAIRE ADDRESSED TO THE STATE DEPARTMENTS  
OF EDUCATION

1. (a) Has your State drawn up some regulations for the building of  
Primary schools?  
Basic schools?  
Secondary schools?  
(Please say 'yes' or 'no')
- (b) Are these regulations binding or only suggestive?
- (c) If these regulations are binding, how are they enforced?  
(Please attach a copy of these regulations to this questionnaire).
2. (a) What agencies are involved in planning of school buildings in your State?
- (b) What part does the State Department of Education play in planning school buildings?
- (c) Does the State Department of Education approve building sites before considering plans for buildings?
- (d) Has the State Department of Education laid down some standards in regard to the size of sites? If the answer is "Yes", what are they and how are they enforced?
3. (a) What percentage of the school-going population (6-11) of your State is at school?  
Boys \_\_\_\_\_% Girls \_\_\_\_\_% Total \_\_\_\_\_%
- (b) What percentage of the actual school-going population (6-11) is provided with adequate school accommodation?
4. Has your State evolved some scheme of overcoming the shortage of school buildings?  
(If the answer is "Yes", please give full details of the scheme).
5. Has your State evolved some scheme of reducing the cost on school buildings and increasing their functional utility?  
(If the answer is "Yes", please give full details of the scheme).
6. What part of the total expenditure on education of your State for the year 1956-57 was spent on school buildings for the age group 6-11?
7. Do you think you will spend more on school buildings in the coming years or less?
8. Is there some scheme in your State by which the local communities or voluntary organisations are asked to contribute in kind or cash towards the school building?  
(If the answer is "Yes", please give full details).

9. Do you foresee a much less "bookish" type of education in your State?

If so, what are the implications of this for the kind of classrooms needed?

10. How can school buildings and classrooms be made flexible to accommodate changes from the traditional school to the basic type school?
11. What percentage of the new schools of your State are so planned as to serve the purpose of a school-cum-community centre? \_\_\_\_\_%.
12. In your opinion, should all schools assume community centre responsibilities?
13. A school building serves two main functions :  
 (a) it provides protection from the elements (rain, dust, etc.);  
 (b) it provides an inspirational environment for teachers and pupils.

Check the one which you consider more important.

14. A school building should protect against unfavourable weather conditions and other nuisance factors such as heat, cold, animals, rain, dust, wind, etc. For your State, please list these and other factors in order—worst nuisance factor first and least nuisance factor last.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_

15. There are certain world-wide trends in school planning. Check the ones that you think might well be worth consideration in our country.
- (a) Main responsibility for planning of schools has been shifted from the Public Works Department to the Department of Education.
  - (b) Less bookish teaching is being adopted and this requires more teaching space.
  - (c) Out-door teaching space adjacent to classroom is becoming more and more important.
  - (d) Build cheaper and cheaper schools but make them more and more functional and more and more attractive for the children.

- (e) Teaching environment is becoming more and more important.
- (f) Instead of talking in terms of sq. ft. per student we have to change our standards to provide required space and equipment needed by a teacher and a class to carry on the learning activities.
- (g) As schools become less bookish, larger schools are found to be more economical.
- (h) All classrooms need much display space for visual aids made by students.
- (i) A better classroom environment permits a teacher to teach a larger class just as effectively. Class size will continue to go up and schools should be designed to assist the teacher.
- (j) Square classrooms seem to be more adaptable to different modes of teaching resulting from a changing school programme than rectangular shaped rooms.
- (k) Schools will continue to expand for the following reasons;
  - (i) Higher percentage of children go to school;
  - (ii) Educational programme increases in scope;
  - (iii) Increase in population;
  - (iv) Community centre facilities are added.
- (l) Some African countries claim to have reduced their school costs by as much as 75% by adapting their school calendar to fit seasonal weather changes (vacations to coincide with monsoon season). Can we also do so in our country?
- (m) Interior decoration is necessary to produce a cheerful atmosphere and to make the room an interesting and pleasant place. Colour is used to give a feeling of comfort and restfulness and to produce a good visual environment.
- (n) Double shift with good facilities is (often considered) less objectionable than single shift with poor facilities.
- (o) A mid-day feeding programme is gaining in popularity all over the world as an important health factor, as an important part in the instructional programme, and also as an aid to learning.
- (p) More and more importance is being attached to community recreational facilities developed in connection with schools.
- (q) If possible; provisions should be made in every school for a place for school and community meetings larger than can be accommodated in a classroom.
- (r) Every site should have a master plan for all future construction.
- (s) A cheap building with high maintenance cost is usually more expensive in the long run than a considerably more costly building with very low maintenance cost.
- (t) A stage in a hall is best located on the site of the hall (on the longer side) to bring the audience closer to the speaker.

## APPENDIX II

### QUESTIONNAIRE FOR DETERMINING THE MOST DESIRABLE AND ECONOMICAL SIZE OF CLASS, CLASSROOM AND SITE FOR PRIMARY AND BASIC SCHOOLS

1. (a) What should be the normal strength of a class ?  
(b) What should be the absolute maximum strength of a class ?
2. (a) What should be the normal size of a classroom for an ordinary school?  
(b) What should be the normal size of a classroom for a Basic school?
3. In urban areas, what should be  
(a) The normal strength of a school run on traditional lines ?  
(please give details).  
(b) The normal strength of a Basic school ?  
(Please give details).
- \*4. What size of site should be considered as minimum essential  
(a) For 3(a) above ?  
(b) For 3(b) above ?

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\* Please indicate the minimum essentials that a school should have in addition to the classrooms and give details as far as possible.



APPENDIX III  
WORK BOOK ON PLANNING FUNCTIONAL SCHOOLS  
FOR INDIA

This is a "Workbook". At the left of each page are some ideas and suggestions that are advanced for study and discussion purposes. At the right, a blank space is left for the purpose of recording notes, suggesting changes, improvements and/or re-statement of the ideas found at the left.

PART I. THE EDUCATIONAL PROGRAMME

A school should reflect an outlook on life and the implementation of its programme should be consistent with that way of life.

A. *What are the aims of education in India?*

1. The principal aim of education is to help people help themselves.

"By education I mean an all-round drawing out of the best in child and man—body, mind and spirit"—*Mahatma Gandhi*.

This aim can be best achieved by

- (a) Raising the standards of living
  - (i) through literacy,
  - (ii) through an improved social situation,
  - (iii) through improvement of the economic situation.
- (b) Raising the health standards,
- (c) Making better citizens.

B. *Philosophy :*

- (a) It places emphasis on the child as a person and upon his individual needs.
- (b) It promotes interest in the physical, mental, emotional, and social development of the child.
- (c) It capitalizes upon the child's own experiences and interests. It also awakens an interest in current problems and draws information from a variety of sources which will give him opportunity for critical thinking and democratic processes.
- (d) It plans with children those experiences which permit the child to participate in planning, executing and evaluating problems; avoiding those practices which are harmful to the child's emotional and social development.

C. *Psychology :*

- (a) Interests are a powerful motivation to learning. (Mind cannot be trained like a machine).

- (b) A good educational programme must make provisions for the wide individual differences that exist among children. (The recognition of individual differences increases the need for a variety of teaching materials, methods and facilities).
- (c) More efficient teaching about abstract ideas is possible when there is a close relationship between the abstract ideas and actual concrete experiences of the child. (This requires materials and space for children to touch, manipulate, operate, produce things, collect, visit and carry on activities that illustrate in a concrete way the ideas with which children are dealing.)
- (d) To fail to provide each child with his share of success is to fail in his education. (Resources are needed through which each child can acquire competence within his ability).
- (e) A child learns better when he is in a state of emotional well-being. (The atmosphere of the school should be pleasant, homelike and attractive).
- (f) Learning proceeds better when the child is healthy in a healthful environment.

#### PART II.A. THE IDEAL TEACHING ENVIRONMENT

Education should enable a person to entertain an idea, entertain a person and entertain oneself.

1. It should enable each child to learn as fast as he can.
2. It should enable each child to develop proper attitude towards dignity of labour.
3. It should enable each child to learn to think.
4. It should enable each child to learn to get along with other people.
5. It should enable each child to develop culturally.
6. It should enable each child to make abstract ideas real.
7. It should enable each child to appreciate the work of other people.
8. It should enable each child to be safe and well.
9. It should enable each child to be happy.

#### B. PRACTICES AND FACILITIES

I. *If you want your child to learn as fast as he can :*

*These practices will be needed—*

1. Individual attention to each child
2. Subject matter suited to the individual's abilities and interests
3. Small groups working together
4. Use of teaching aids
5. Increasing pupil participation

6. Creating proper learning situations
7. Elimination of wasteful routine
8. Reduction of outside distractions
9. Ability to see well anywhere in the room
10. Ability to hear well anywhere in the room
11. Development of good study habits
12. Use of many reference materials.

*These classroom facilities will be needed :*

1. Adequate classroom space
  2. Movable furniture
  3. Storage facilities for materials for each group
  4. Adequate table and display space
  5. Sufficient number of bookcases
  6. Space for art, craft, nature study, science and reading
  7. Drinking arrangement
  8. Toilets near classroom
  9. Adequate supply storage
  10. Ventilation designed to eliminate noise and interference from other rooms
  11. Colour scheme scientifically planned
  12. All surfaces designed to eliminate glare
  13. Adequate natural and artificial light
  14. Adequate bulletin boards, chalk-boards.
- II. *If you want your child to develop proper attitude towards dignity of labour :*

*These practices will be needed :*

1. Opportunity to work with hands
2. Reduce emphasis on bookish education
3. Produce things which have utility
4. Meet some of his own needs in regard to equipment
5. Meet some of the requirements of the class and the school by making—
  - (a) Charts, models and other visual aids
  - (b) Craft equipment
6. Assume responsibility for the cleanliness and proper maintenance of the school

*These classroom facilities will be needed—*

1. Craft equipment
2. Adequate space for storage to avoid cluttering of materials

3. Work benches
4. Movable room equipment
5. Sinks
6. Adequate display space
7. Arrangements to eliminate disturbances in other rooms
8. Brooms and dusters—large and small.

III. *If you want your child to learn to think :*

*These practices will be needed—*

1. Creating problem situations
2. Opportunity to experiment
3. Use of a variety of materials
4. Development of questioning attitude
5. Making learning purposeful
6. Correlating learning with the environment.

*These classroom facilities will be needed—*

1. Book storage space
2. Scientific equipment and place to keep it
3. Workshop space
4. Craft equipment and place to keep it
5. Chalk-boards and bulletin boards

IV. *If you want your child to learn to get along with other people :*

*These practices will be needed—*

1. Committee work in planning and studying
2. Freedom to engage in activities which bring pupils into close contact with one another
3. Study groups divided according to abilities

*These classroom facilities will be needed—*

1. Movable furniture
2. Other classroom equipment not fixed to floors
3. Activity and display space
4. Plentiful storage space
5. Chalk-board space in each centre.

V. *If you want your child to develop culturally :*

*These practices will be needed—*

1. Well-developed programme in the arts: music, dance, drama, drawing and painting

2. Celebration of festivals
3. Observance of international days such as the U.N.O. Day, the W.H.O. Day and so on.

*These classroom facilities will be needed—*

1. Flat working surfaces
2. Movable trays for art tools and clay
3. Acoustical treatment
4. Radio and record player with outlets
5. Separate desks and chairs easily moved
6. Adequate storage space and display space
7. Library centre
8. Work Bench with sink
9. Musical instruments and place to store them
10. Large, unbroken wall surfaces for children's murals
11. Easels
12. Costume storage
13. Mirror.

**VI.** *If you want abstract ideas made real to your child :*

*These practices will be needed—*

1. Provide for excursions and experiments
2. Use visual aids made by others
3. Build models and other visual aids as graphs and charts
4. Dramatization
5. Duplicate as far as possible real life situations (Projects).

*These classroom facilities will be needed—*

1. Display space and cases
2. Work area
3. Work benches
4. Costume storage
5. Darkening shades
6. Sand table.

**VII.** *If you want your child to appreciate the work of other people :*

*These practices will be needed—*

1. Display the good work of pupils
2. Display the good work of others
3. Have opportunity to make things
4. Help one another in group construction.

*These classroom facilities will be needed—*

1. Display space for three dimensional projects as well as tack-board
2. Work activity space.

VIII. *If you want your child safe and well :*

*These practices will be needed—*

1. Easy access to outside
2. Floor not cluttered with equipment and projects
3. Encourage good health habits
4. Provide for proper lighting
5. Reduce nervous strain to a minimum
6. Reduce outside distractions to a minimum
7. Regular medical check-up and follow-up service.

*These classroom facilities will be needed—*

1. Classroom doors to open outside
2. Proper storage space
3. Sinks and drinking fountains in all classrooms
4. Toilets easily accessible
5. Adequate brightness and distribution of light
6. Medical room.

IX. *If you want your child to be happy in school :*

*These practices will be needed—*

1. Opportunities to follow one's own interests and abilities
2. Opportunities to explore, investigate, discover and create
3. Opportunities to cooperate with groups
4. Opportunities to express in the ways best suited to his abilities
5. Opportunities to develop into a leader or good fellow worker
6. Opportunities to complete a task without interference caused by poor working conditions
7. An attractive and pleasant room in which to work
8. Opportunities for outdoor work
9. Opportunities for recreational activities.

*These classroom facilities will be needed—*

1. Space for varied programme with adequate storage
2. Development of centres with various activities and interests within the room

3. Space and acoustical treatment which will enable several learning activities to take place at the same time without interfering with one another
4. Adequate activity storage and work space
5. Movable room equipment
6. Provision for movable furniture that can be arranged quickly for small group work with enough distance in between so that there will be little interference between groups
7. Adequate working surface above the floor so that projects such as murals may be stored so that they will not be stepped on before completion.
8. Carefully planned light of suitable intensity without glare
9. An attractive colour scheme scientifically planned
10. Provision for display of decorative materials
11. Adequate space so that clutter may be avoided.

### PART III. THE PROGRAMME AND PLANT IMPLICATIONS

The modern school programme seems to be distinguished from that of the past in that it emphasizes learning through activity. Presently the whole child and his growth in all aspects is the purpose of teaching. This growth is brought along through learning activities, directed by a skilled teacher, in classrooms that have adequate space, instructional materials, and equipment to achieve the desired goal.

- A. *The classroom should be arranged so that the following learning activities may be promoted :—*
1. Small groups working together
  2. Committee work
  3. Ability grouping for study and work
  4. Play and work activities which bring each child in close contact with every other child in the room.
  5. Experimental opportunities
  6. Problem-solving situations
  7. Situations involving the use of visual and audio-visual aids
  8. Activities involving the use of variety of reference materials
  9. Activities involving the development of cultural skills, such as dramatics, singing, dancing, music appreciation, painting, drawing, construction and modelling.
  10. Activities using real-life situations
  11. Group construction
  12. Display of good health habits
  13. Exploring and investigating areas of special interest
  14. Activities planned to develop leadership and followership roles.

B. *Typical activities to be found in a Primary School are :*

1. Gardening
2. Cooking
3. Playing house
4. Listening to music
5. Writing and spelling
6. Art
7. Using hobbies
8. Music
9. Recreating community enterprises in the classroom
10. Sewing
11. Making models
12. Caring for animals
13. Science
14. Card-board modelling
15. Drawing maps
16. Singing
17. Celebrating festivals
18. Group singing
19. Collecting and exhibiting specimens
20. Reading
21. Speech
22. Arithmetic
23. Puppetry
24. Working with materials
25. Holding group discussions
26. Dramatizing stories and creating plays
27. Making booklets
28. Experimenting
29. Practising good health habits
30. Writing reports, letters, stories, poems and articles.
31. Using audio-visual aids
32. Solving problems
33. Spinning
34. Weaving
35. Clay modelling
36. Paper work
37. Knitting.



## PART IV. SOME CHARACTERISTICS OF A GOOD SCHOOL PLANT

**PROBLEM:** *What adaptations to Indian education are desirable and possible?*

A good school plant is one that is useful to the people for the purpose that they conceive. It may or may not meet the following standards. The standards that follow merely serve as a discussion "springboard."

I. *A good school plant promotes health and safety.*

1. Light, both natural and artificial, is adequate.
2. Interior finishes aid illumination and prevent glare.
3. Proper temperature and ventilation are conducive to comfort.
4. Freedom from hazards of accident, fire and panic is evident.
5. Sound is controlled so that groups do not interfere with each other.

II. *A good school plant is functional.*

1. It is planned to house a wide variety of activities.
2. It is planned to fit the educational programme.
3. It is planned that all space is utilized properly and to the utmost.

III. *A good school plant is adaptable.*

1. It is planned to meet future needs.
2. Multiple use of space is provided where practicable and feasible.
3. Facilities are planned for use of community activities in addition to regular school work.

IV. *A good school plant is flexible.*

1. It lends itself to the changing educational programme.
2. Partitions are non-weight bearing.
3. The site and location of buildings are such that additions can readily be made.
4. Facilities used by the community are grouped so that they are readily accessible.
5. Furniture is movable and functional, i.e., designed to fit the pupil and his needs.

V. *A good school plant is economical.*

1. It does not cost too much for the quality obtained.
2. Multiple use of facilities is made possible.
3. Practical architects design buildings and write specifications to save public funds as well as to provide adequate facilities.

4. School administrators reduce costs and prevent poor workmanship by close supervision.
5. School plants are used largely for space and equipment purposes rather than for superficial decoration.

VI. *A good school plant is attractive.*

1. The exterior is pleasant and harmonious.
2. The interior is pleasing and comfortable with furnishings and wall colours blending to create a desirable atmosphere.
3. The architecture should be contemporary and conform to the indigenous architecture of the rural or urban locality. Any new features should conform with this indigenous spirit.

VII. *A good school plant is located on an adequate site.*

1. It should be adequate not only for the present requirements but also for future development. (What should be the size of an adequate site for a (i) Primary school, (ii) Middle school, (iii) Secondary school ?
2. The campus terrain lends itself for play areas, gardens, athletics and vocational projects.
3. The site is in a pleasing environment away from noise, smoke, dust and congested traffic.
4. The site is accessible and as near the centre of population as may be possible.
5. The building is located on site so as to secure maximum use of heat of sun during winter months and with building projections providing shade during hot months of year. Other characteristics of the site should be considered in the individual design of the school.
6. Proper consideration should be given for making provision for community recreation and community facilities.
7. Proper consideration should be given for teachers' quarters.

PART V. PLANNING PROBLEMS FOR DISCUSSION

A. *Master Planning*

1. Size of school
2. Size of class
3. Size of site
4. Needed facilities
5. Play grounds
6. Community recreation
7. Planning for community use
8. Teachers' houses

9. School lunch facilities
10. Building location and orientation
11. Landscaping

B. *How to effect economies?*

- (a) Proper understanding of the word "Economy"
- (b) Economy through :—
  - (i) Reduction in square-footage
  - (ii) Cheaper specifications
  - (iii) Less amenities
  - (iv) Smaller sites
- (c) Or through :—
  - (i) Study of factors affecting building costs in different parts of India.
  - (ii) Study of type of constructions suitable for various regions of India.
  - (iii) Use of new light-weight materials (for urban areas).
  - (iv) Proper siting of schools.
  - (v) Re-orienting of ideas on soundness of buildings and factors of safety—  
Foundations, thickness of walls, floors, roofs.
  - (vi) Economic use of space—  
Multi-purpose use, flexibility
  - (vii) Basic and comprehensive designing
  - (viii) Elimination of all unnecessary features and needless decorations
  - (ix) Simpler forms of construction and detailing
  - (x) Modular Co-ordination
  - (xi) Standardisation of equipment, furniture, etc.
  - (xii) Voluntary self-help
  - (xiii) Over-all enlightened outlook.

C. *Nucleus First Plan*

1. Designs that would lend themselves to the nucleus idea.
2. What should be considered the minimum nucleus?
3. Types of temporary shelters
4. Needed environmental controls
5. Needed guide material

D. *Miscellaneous planning problems*

1. Doors
2. Windows

3. Storage
4. Bulletin Board
5. Chalk Board
6. One or two storey buildings
7. Drinking facilities
8. Sanitary facilities
9. Teachers' Room
10. Fencing and walls
11. Assembly areas
12. Administrative facilities
13. Custodial Service facilities
14. Approval of Plans.

## APPENDIX IV

### LIST OF DELEGATES TO THE REGIONAL SEMINARS

#### MINISTRY OF EDUCATION :

Shri D. I. Lall,  
Assistant Educational Adviser

#### T.C.M. EXPERT :

Mr. F. P. Schroeter

#### CENTRAL P.W.D.

Shri M. M. Rana,  
Senior Architect

#### ROORKEE :

Shri M. H. Pandya,  
Architect, Central Building Research Institute

#### ANDHRA PRADESH :

1. Shri P. Tripth Reddy,  
Dy. Chief Engineer (Buildings),  
P.W.D., Hyderabad (Dn.)
2. Shri Hashmat Raza,  
State Architect,  
P.W.D., Hyderabad (Dn.)
3. Shri A. Phanendru  
Dy. Director of Public Instruction (Finance).  
Education Department,  
Hyderabad (Dn.)

#### ASSAM :

1. Rajkumar Shri Sureswar Gohain,  
Basic Education Officer,  
Assam, Shillong
2. Shri K. Barua,  
Addl. Chief Engineer,  
Assam, Shillong
3. Shri M. Barpujari,  
Assistant Architect,  
Assam, Shillong

#### BIHAR :

1. Shri M. F. Shrivastava,  
Assistant Director of Education,  
Bihar, Patna

2. Shri B. Prasad,  
Engineer Incharge,  
Educational Building Research Unit,  
*Patna*
3. Shri D. R. Parandekar,  
Acting Government Architect,  
*Bihar*

## BOMBAY :

1. Shri V. H. Bhanot,  
Deputy Director of Education,  
*Poona*
2. Dr. D. V. Chickermane,  
Deputy Director of Education,  
*Poona*
3. Shri D. A. Jayavant,  
Assistant Architect,  
Government of Bombay
4. Shri R. M. Lakdawala,  
Superintending Engineer,  
North Gujerat Circle, *Ahmedabad*

## MADHYA PRADESH :

1. Shri G. Y. Tankhiwale,  
Dy. Director of Public Instruction,  
Madhya Pradesh,  
*Bhopal*
2. Shri Raghuvir Sahai Saxena,  
Headmaster,  
Basic Training School,  
*Murar, (Gwalior)*
3. Shri D. G. Karanjgaokar,  
Government Architect,  
*Gwalior*
4. Shri N. H. Dharangadharia,  
Assistant Government Architect,  
Madhya Pradesh,  
*Gwalior*
5. Shri S. B. Dube,  
Superintending Engineer,  
*Bhopal*
6. Shri S. R. Solanki,  
Senior Architect of Heavy Electricals Private Ltd.,  
*Bhopal*

## MADRAS :

1. Dr. M. D. Paul,  
Dy. Director of Public Instruction (Basic and Elementary)  
Department of Education,  
*Madras*

- 2 Shri K. L. Palaniswamy,  
Special Officer for Educational Survey,  
Department of Education, *Madras*
- 3 Shri Vincent Isaacs,  
Consulting Architect to the Government of Madras,  
*Madras*
- 4 Shri P. Sivalingam,  
Dy. Chief Engineer (General and Buildings),  
P.W.D., *Madras*

## MYSORE :

1. Dr. S. S. Raichur,  
Dy. Director of Public Instruction  
(Head Quarters), *Bangalore*
2. Shri D. Visveswarayya,  
Principal,  
Post-Graduate Basic Training College,  
Doddaballapur, Bangalore Distt.,  
*Mysore State*
3. Shri H. K. Panditaradhya,  
Executive Engineer (Buildings Division),  
*Bangalore*
4. Shri B. R. Manickam,  
Government Architect and Town Planning  
Officer, P.W.D. Offices,  
*Bangalore*
5. Shri T. Vasudevaiiah,  
Dy. Director of Public Instruction,  
Mysore Division, *Mysore*

## PUNJAB :

1. Dr. Jaswant Singh,  
Dy. Director of Public Instruction (Colleges),  
*Chandigarh*
2. Shri Jagdish Raj,  
Assistant Director (Teachers' Training),  
*Simla*
3. Shri G. C. Khanna,  
Chief Engineer (B & R),  
*Patiala*
4. Shri P. J. Ghista,  
Acting Consulting Architect  
to the Government of Punjab,  
*Patiala*

## RAJASTHAN :

1. Shri Ram Narain Sharma,  
Deputy Director of Education,  
*Jodhpur*

2. Shri R. G. Gupta,  
Deputy Director,  
Basic Education, *Bikaner*
3. Shri Hari Datt Gupta,  
Technical Assistant to Chief Engineer,  
*Jaipur*
4. Shri Parma Nand,  
State Architect,  
*Jaipur*

## UTTAR PRADESH :

1. Shri H. H. Usmani,  
Officer on Special Duty (I),  
Uttar Pradesh, *Allahabad*
2. Shri Austin M. Lobo,  
Assistant Architect,  
Chief Engineer's Office,  
U.P., P.W.D., *Lucknow*
3. Shri Hari Shankar Sharma,  
Dy. Director of Education,  
Uttar Pradesh, *Lucknow*

## WEST BENGAL :

1. Shri A. C. Sen,  
Chief Inspector of Technical Education  
& Director of Technical Training,  
Education Directorate,  
*Calcutta*
2. Shri Bijay Kumar Bhattacharya,  
Adhyaksha, Shiksha Niketan,  
Kalanavagram, *Burdwan*
3. Shri P. C. Chakravarti,  
Project Officer and Executive Engineer,  
Department of Education,  
*Calcutta*
4. Shri S. C. Mukherji,  
Department of Architecture,  
Bengal Engineering College,  
*Howrah*

## DELHI :

1. Shri R. L. Hingorani,  
Executive Engineer,  
Delhi State Division III,  
*New Delhi*
2. Shri N. R. Gupta,  
Assistant Director of Education and  
Officer on Special Duty (Capital Works),  
*Delhi*



**HIMACHAL PRADESH :**

1. Shri Udham Singh,  
Principal Engineering Officer,  
*Simla*
2. Shri Hari Singh,  
Deputy Inspector of Schools  
Mahasu District,  
*Simla*
3. Shri Bidhi Singh,  
Acting Principal,  
Basic Training College,  
*Solan*

**MANIPUR :**

Shri Manihar Singh,  
Principal Education Officer,  
Territorial Council, *Imphal*

**N.E.F.A :**

Shri Durairaj,  
Superintending Engineer,  
Department of Planning and Development,  
N.E.F.A., *Shillong*

**PONDICHERRY :**

Shri Radhakrishnan,  
Assistant Engineer,  
Public Works Department,  
*Pondicherry*

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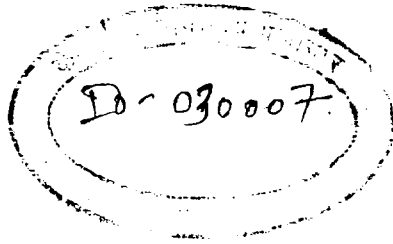
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