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SOME NOTES ON SCHOOL SANITATION

by

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1. Introduction

The school is an expensive and important community facility. To ensure every opportunity for the younger generation to improve on its elders some communities are willing to spend one third or more of their public funds on building and running their schools. Such an activity should evidently be well-planned from all points of view.

Most of the environmental factors with which sanitarians are usually concerned may affect the school child, who during the years of greatest physical growth spends half of his waking hours in school. Boarding school students spend most of their time in the school environment. The learning process itself is aided by good environmental conditions which permit the child to concentrate efficiently on his school work. In addition, various environmental factors which can be controlled affect the likelihood of disease transmission and of accidents.

Thought should be given to school sanitation at all stages: before a site is selected, when the building is being designed and built and its accessories are being chosen and installed, in providing for the operation and maintenance of the building, and in the class curricula devoted to hygiene. The importance of these considerations should be emphasized when budgets for school construction and maintenance are discussed.

2. Location of schools

The school child should not be tired by too long a walk or ride when he reaches school, and the young child should, if possible, be able to reach school without having to cross heavily travelled streets. Central locations are thus advantageous. But even more important than ready accessibility in choosing a location for a school are adequate space and light and freedom from excessive noise and polluted air. In sub-urban communities it may be possible to satisfy all these requirements without difficulty or heavy expense. In rural areas long distances from house to school, especially at secondary level, may be inevitable. In city centres, where land is scarce and expensive, space for athletics may be minimal, and poor light and air may be unavoidable.

For these reasons, the choice of school location should be carefully made and specific steps taken to offset specific unfavourable environmental factors in the chosen site. For instance, boarding arrangements or buses will usually be needed for secondary school children in rural areas. On the other hand, a city school with poor natural lighting and noisy environment may need to depend largely on artificial light and conditioned air. Similarly, where children are obliged to cross busy thoroughfares to reach school, pedestrian over- or under-passes may be built.

Specific standards for school grounds are not easy to fix or maintain, but may be useful as a guide. In some American cities approximately the following have been adopted:

1) Space: 1/2 hectare per 100 children plus 2 hectares in elementary schools or plus 4 hectares in secondary schools.
2) Accessibility: 1 km walk (elementary) or 3 km walk (secondary), or 1/2-hour bus ride (elementary) or 1-hour bus ride (secondary).
3) School grounds: free of insects, rodents, noise, bad air.
4) Water, electricity, sewerage, fire and police service available.

3. Design of school building

The school building should be laid out in such a way as to give classrooms the most advantageous orientation, depending on local climatic conditions. Adminstrative services should be centralized. Noisy activities, such as machine shops and music rehearsal rooms, should be separated as much as possible from study classrooms. In large schools the auditorium is potentially useful for various community activities and should be designed and located within the building with this in mind. In case of need for emergency egress, upper storeys (if any) should have two or more stairways to the ground level. Stairways should be wide, not steep and well-lit. Outside doors should be wide and hung so as to swing toward the outside of the building.

The classroom should be a pleasant and comfortable room. Its physical qualities have an effect on the schoolchild's ability to concentrate on his lessons. Satisfactory temperature, ventilation, lighting and acoustics can to a large extent be assured in the design of the room. What is then lacking can be provided to any desired degree of excellence in decorating and equipping the room.

A great deal of research has been done with the aim of determining optimum standards based on physiological and psychological considerations. Studies have also been made to determine whether natural ventilation and lighting have any basically superior qualities as compared with artificial ones. Those who design school buildings should be acquainted with the up-to-date results of this work. At the same time they should recognize that conclusions reached for schools in other climatic and economic conditions cannot be blindly adopted in their own countries. Similar studies are necessary in this part of the world.

Maximum use should be made of natural heating, ventilation and lighting in the design of schools in most Eastern Mediterranean communities. Temperatures are moderate, sunlight is strong, stormy weather is infrequent, and budgets are limited. This means that rooms should be large, high-ceilinged, and have ample window-space. Room-heating in winter, where needed, may be accomplished or supplemented by direct sunlight. Otherwise, direct sunlight in classrooms should be avoided. Air movement in hot weather can be accomplished by putting windows on two sides of the room and by various kinds of vents. Dust or sand may be a problem. Indigenous building methods offer many suggestions on how to insulate rooms and heat, cool and ventilate them. These should be taken into consideration in designing school buildings as they may make more comfortable school-rooms and at the same time save money.

Natural lighting is usually easy to assure in the countries of this Region. Since the sky brightness is greater than in Europe and North America, window areas can be correspondingly less. Windows should extend to the ceiling and the furthest desk should not be more than twice as far from the window as the height of the window above the desk tops. Windows are usually required to be between 15 and 20 percent of the floor area (e.g., a room of 6 x 10 m. would need windows of 9 to 12 m^2 area).

Dormitories in boarding schools must be designed so that sleeping children will be adequately separated (e.g., beds by 1 meter, heads by 2 m.).

4. Equipment and decoration

While they are normally included in the design of a school, equipment and interior decorating can be modified even after construction is finished and so are dealt with separately in this paper.

Equipment includes water supply, sewage disposal installations, space heating, cooling and ventilating facilities, restaurant and kitchen facilities, electric lighting (and sometimes power supply) and fire protection devices. Interior decorating of hygienic interest includes ceilings, walls and floors of classrooms, halls, stairways, washrooms, kitchens and gymnasiums, as well as choice and colour of furniture and chalkboards.

The most important single item is certainly a clean water supply for drinking, handwashing, and possibly also for toilets, showers and kitchen use. If running water is available, 20 to 80 litres per student per day may be needed.

If the school is not connected to the community sewerage system, a septic tank and tile disposal field will need to be built on the grounds. In the absence of running water, pit latrines will be built. Handwashing facilities near the latrines are needed.

One drinking fountain, one wash basin and three WC's ought to be provided for each 100 children in the school, (For boys, three urinals and one WC per hundred may be allowed). Spring-loaded or "waste-not"-type taps may be provided to conserve water. If children take part in athletics during school hours, showers should be provided at the rate of at least three per hundred children.

Space heating, cooling and ventilating equipment (including air conditioning equipment) is not of great importance in most communities of this Region at present. In some very hot regions schools, like all other activities, close during the hottest hours of the day. Air conditioning might be considered in such places in the interests of greater work efficiency (as it has been in oil company offices). Conventional air conditioning dehumidifies the air, and is needed in humid climates.

In dry climates various kinds of "desert coolers" can be used which derive their cooling effect from the evaporation of water and which are far cheaper to buy and to operate. In some circumstances a fan placed in the ceiling to exhaust air from the room and discharge it through a roof vent is helpful. To be effective, such a fan should be capable of withdrawing a quantity of air equal to the room's volume every minute.

Depending upon the inherent fire hazard of the school building some fire fighting equipment may be provided, on the premises. If the school is located in an upper storey of an existing building with a single stairway, an outside metal fire stairway may need to be provided.

Most schools have some food service facilities, ranging from snack-counters to complete restaurant faciltries. Provisions must be made in even the simplest of these for clean and efficient storage, preparation and serving of food. Walls and floors should be of tile or other hard, washable surface. Cupboards should close tightly and be screened against insects and rodents. A refrigerator should be available if milk is served. Tables and counters where food is prepared and served should be smooth and impervious so they can be kept clean. Stoves should be vented. A sink with hot water is needed for dishwashing, a second sink for rinsing (if possible), and a rack for air drying of dishes. In large institutions automatic dish-washing equipment may be justified. Preparation, serving and washing-up should be carried out in separate parts of the room, or in different rooms. Cleaning materials and insecticides should be stored separate from foods. A closet should be provided where food handlers can keep their uniforms and hang their street clothes, as well as a toilet and wash basin. Garbage should be kept in a closed receptacle in the kitchen. If there is no municipal refuse collection, the school needs a refuse pit with a tight cover and an incinerator for paper. The dining area should also have smooth, washable floor (and tables and chairs, if provided). Simple, chip-resistant crockery or plastic dishes should be used. Where complete meals are served compartmented plastic or metal trays, on which the meals are served directly, are convenient and facilitate dish-washing procedures.

School-room and corridor floors are subject to tremendous wear. They must be hard, smooth and resistant to cleaning materials. Asphalt tile is attractive, but deteriorates rather rapidly. Concrete tends to get dusty. Rubber, plastic and linoleum surfaces are good; terrazzo is excellent, but slippery; a non-skid surface is required if this material is used.

Cheap, cleanable but sound-proof materials should be used for school-rooms walls. The surface should not be glossy (except in washrooms and kitchens) but should have a reflectivity of 60 - 70%. This is achieved by using light pastel colours. In hot climates "cool" colours (blue and green) are favoured. Chalk-board today is often green rather than black. To facilitate seeing it, the lower part of the walls and a strip around the chalk boards is painted a darker colour. Ceilings should be finished in white plaster.

In most circumstances in this Region, natural illumination from the windows will suffice for day-time classes. Electric lights will be provided for evening classes and sometimes to supplement daylight on dark days. According to present illumination standards enough light should be provided to give an illumination of 10 to 30 foot-candles on the darkest desk top[1]. Incandescent bulbs should be enclosed in frosted glass globes to diffuse the light. If lamps are going to be extensively used fluorescent lamps may be chosen; they are more expensive in initial cost but operate more efficiently (and coolly) and hence more cheaply.

As stated at the outset, the considerations in this section apply equally to new school buildings and to old ones. It is not necessary to wait until a new building is provided to improve school children's environment.

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[1] In a typical case of a classroom 10 x 7 m large with lamps 2 m above desk tops, five 200-watt lamps spaced in an "X" will give about 10 foot-candles illumination.

5. Repair and maintenance

Like every building, a school needs periodic repairs and constant maintenance. Adequate budgetary provision must be made to cover daily cleaning, annual plastering and painting, seasonal overhauling of heating, plumbing and other systems, replacement of electric lamps, etc. Special attention should be paid to safety factors, such as testing and recharging fire extinguishers.

6. Teaching good sanitation

School children are a favourite target for advice on public health and sanitation. Posters depicting unhygienic and hygienic ways of conducting various household activities adorn the classroom walls in many communities. In many schools instruction is given on personal hygiene and public health.

Such instruction, however, cannot have full impact if the physical means to put it in practice are absent. How can you persuade a child to form good study habits at home when his school bench is crowded and badly lit? What does a lecture on safe water and excreta disposal mean to a child in a school with neither of them? What use is it to teach food sanitation and permit the school canteen to operate in a filthy manner? Why talk about hand-washing if wash basin and soap are not available in the school?

On the other hand, if the authorities provide the basic sanitary needs for a school, it should not be difficult for teachers to stimulate the school children's interest and sense of pride and responsibility in using the facilities properly and in helping maintain them. It can also be foreseen that children from such a school will take ideas home and gradually introduce some of them into the home environment, no matter how conservative are local ways.

7. Responsibility of health administrations

In most countries the intervention of health authorities in school sanitation is limited to health education activities. Physical planning of schools, design and equipping of school buildings, and surveillance of the sanitary condition of schools are the sole responsibility of education authorities.

It is evident that health ministries and local health administrations should be interested in the matter whenever the health and comfort of school children are threatened. There is in fact scope for considerable activity, mainly in the field of sanitary engineering. As suggested in this paper, such interest should begin with the selection of school sites and the study of certain aspects of school building designs. Out of experience gained, codes would be developed or revised.

REQUIREMENTS OF SCHOOLS IN THE SUDAN[1]

RECOMMENDATIONS

I BOYS' ELEMENTARY SCHOOLS

Maximum of 50 pupils per class and 4 classes per school age of pupals 7 - 12 (average).

(a) CLASSROOMS:

(i) Number : 4 classrooms for a full school of four classes.

(ii) Floor Space : 8 ft^2 (0.78 m^2) for pupils under 8 years of age.

8 1/2 ft^2 (0.82 m^2) for pupils over 8 and under 11 years of age.

10 ft^2(0.97 m^2) for pupils over 11 years of age with a space of 6 ft. (1.8 m) between the blackboard and the front row of the pupils.

(iii) Dimensions : In order to conform to (ii) above and at the same time satisfy educational requirements.

One classroom 8.5m. by 5.5m.
Two classrooms 9.0m. by 5m.
One classroom 11.5m. by 5.5m.

(iv) Cubic Space per Pupil : A minimum of:

100 cubic feet for pupils under 8 years of age.
196 cubic feet for pupils over 8 years of age.

(v) Height of Inside Walls : A minimum of 12 ft. (3.7m.).

(vi) Seating Space : Each pupil should be allowed 20 inches (50cm).

(vii) Blackboard : Should be either built into or fixed to the end wall.

(viii) Window Space : Should be not less than 1/8 of the floor area and should include the door. Window shutters should be divided into two sections.

(ix) Ventilators : Should be provided. They should be of the cheapest type with mosquito wiring.

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1. Information received from the Government of Sudan under cover of letter Ref. No. 44.Z.21/6 dated 3 July 1966.

(x) Lighting : Should come from both sides, if possible i.e. from north and south, but at any rate from the side to the left of the pupils, i.e. from the north. There should be no windows in the blackboard wall.

(xi) Floors : Should be made of hard, permanent material such as will permit of adequate cleaning.

(xii) Shelves and Cupboards : Shelving should be provided on classroom walls; also built-in cupboards, where the construction allows.

(b) OFFICES:

Each school should have two offices, one for headmaster and another as a common room for the assistant masters.

(c) VERANDAHS AND SUNSHADES:

Verandahs should be provided on the southern side of the main block of classrooms and sunshades on the southern side of the two subsidiary classrooms. Sunshades should also be provided on the east wall of the eastern classroom of the main block while their provision is further desirable on the westers rooms.

(d) STOREROOMS:

As in standard design.

(e) LATRINES:

The following accommodation of either bucket or pit latrine compartments should be provided :

1 for staff
5 for the first 100 pupils
3 for each succeeding 100 pupils.

All latrines should be constructed to standard type as laid down in the Local Public Health Regulations.

(f) WATER SUPPLY:

Should come from pure sources. Where zeers, (pottery storage jars) are used, arrangements should be made for the water to be drawn off by tap and for the supply to be capable of being cooled and sterilised where necessary. Zeer houses should be contructed to standard type.

(g) WASHING FACILITIES:

Should be provided in all schools.

(h) SIZE OF PLAYGROUND:

A minimum of 20 sq. ft. (1.9 m^2) per pupil should be allowed, exclusive of the area occupied by buildings and absorption beds.

II GIRLS' ELEMENTARY SCHOOLS

(a) CLASSROOMS:

Maximum of 30 - 40 pupils per class. Age of pupils 7 - 12 years.

(i) Number : Four classrooms (for a full school of four classes) and a domestic science room.
A needlework room, which is included in the standard design, is considered to be desirable but not essential.

(ii) Floor Space : As in the case of Boys' schools.

(iii) Dimensions : In order to conform to the requirements of (ii) above and also to satisfy educational needs:-

4 classrooms 7.5 X 5.5 metres.

N.B. (The number of girls in the 3rd. and 4th. year classes very rarely reaches even the 30 mark).

(iv) Cubic Space per Pupil)
(v) Height of Inside Walls)
(vi) Seating Space)
(vii) Blackboard) As in the case of boys schools.
(viii) Window Space)
(ix) Ventilators)
(x) Floors)
(xi) Shelves and Cupboards)

(b) OFFICES:

Not required.

(c) VERANDAHS AND SUNSHADES:

As in the case of boys' schools.

(d) STOREROOMS:

One is required.

(e) LATRINES:

As in the case of boys' schools, except that no additional latrine is required for the staff where living quarters are provided for the school-mistresses on the premises.

(f) WATER SUPPLY)
(g) WASHING FACILITIES) As in the case of boys' schools.
(h) SIZE OF PLAYGROUND)

III INTERMEDIATE SCHOOLS (and other above that level).

(a) The minimum floor space provided per pupil should be 12 sq. ft.(1.1m^2).

(b) The recommendations set forth above regarding elementary schools in respect of verandahs, sunshades, ventilators, lighting, latrines etc., should likewise apply to schools of a higher grade.

(c) GIRLS' SCHOOL:

The Committee considered it to be most desirable that quarters for mistresses on the premises should be provided in all schools.

(d) BOARDING SCHOOLS:

(i) Dormitories : There should be a space of 6ft. (1.8m) between heads and 3 ft. (0.9m) between beds to apply to pupils of all ages.

(ii) Washing Facilities : Adequate arrangements must be made, but where tap water is available showers should be provided at a minimum rate of 5 per 100 pupils.