to be accommodated, thirteen to fourteen feet in height may be necessary. These regulations work out for a class-room in a secondary school for twenty-five scholars at twenty-three feet six inches by nineteen feet by twelve feet high.

Having settled the size of the class-room, the question of lighting has to be considered more in detail. It seems hardly necessary to mention that it should be lighted from the left hand of the scholar only. The size of glass area to be provided is more difficult to lay down. This will be affected by two considerations—the aspect and the situation. To take the latter first, it is obvious that a town school in a crowded part would not obtain so much light from a window of a given area with buildings opposite as a building situated in the open country with an unobstructed prospect. The same applies in some degree to the aspect, windows quite satisfactory for a northern aspect being unsuitable for a southern one. Class-rooms should be so placed that they have sun in them during part of the day, but not always; north, west and southwest, if unprotected, should be avoided.

The Board of Education lays down one-fifth as the approximate area of window glass to the floor area to light a class-room satisfactorily. In very confined sites, however, one-quarter is sometimes found necessary, and in open and exposed sites one-sixth will sometimes suffice. Anything beyond the amount of glass actually necessary to give a satisfactory light is undesirable, as it tends to make the room cold in winter and hot in summer, and adds considerably to the difficulty of the effective treatment of the room, both externally and internally. The glass line should not be more than four feet above the floor, with the heads of the windows carried up as near the ceiling as possible.

The windows should be so arranged in the wall that all the seats are equally well lighted. This is apt to leave the master's desk somewhat underlighted, and in order to rectify this Mr. Bell and I provided in the class-rooms at Christ's Hospital a small window to light the master's desk, kept low down so that he can also see out of it, and I believe this has been appreciated. Under no circumstances should there be windows facing the scholars, and windows in the opposite wall facing the master are almost equally objectionable. Mullions, transoms, and window bars are, in my opinion, unobjectionable if the glass area is calculated independently of them. Plain sheet or plate-glass is the best for glazing, and the view of the sky should not be shut out from the scholars.

Glazed brick or tiled walls, except as dados, are not suitable for class-rooms of the character we are considering; the reflected light is trying to the eyes, and being non-porous they are not considered hygienic for crowded rooms. A white plaster ceiling is the best, with light green or grey walls, according to aspect, the woodwork painted white or, better, left its natural color. A glare in a class-room is to be as carefully avoided as gloom.

The artificial light of class-rooms, perhaps, hardly comes under consideration to-day, but is of equal importance when much evening work is done. Carefully regulated incandescent electric lighting is the best, and greatly simplifies ventilation. Gas is better avoided. Perhaps the best illuminant is composed of inverted arc lights with the room lit by reflection from the ceiling, but it is extravagant in current. Single incandescent lamps equally distributed over the ceiling give a pleasant and well-diffused light. Groups of lamps in electroliers should be avoided in class-rooms. One eight-candle lamp, if not hung too high, should light sufficiently twenty-four feet super. of floor area.

For the ventilation of class-rooms it is more difficult to lay down any definite rules. The problem may be simply stated as follows:

The time required to contaminate the air in a class-room of an elementary school of the capacity required per scholar—i.e., ten feet per scholar—is eight minutes, while for that of a secondary school it would be a quarter of an hour. The temperature of the room, according to the rules of the Board of Education, has to be kept at from 56 degrees to 60 degrees Fahr. The problem, therefore, is how to change the air of a class-room from four to eight times an hour, and, at the same time, to avoid draughts and keep the temperature at from 56 to 60 degrees.

In discussing ventilation it is not possible to exclude altogether the question of heating. This can be done by open fireplaces, hot water, or steam and warm air. In one set of competition conditions sent to me I was surprised to find a condition, drawn up by an eminent architect, stating that the top of the fireplace openings should be four feet six inches high above the floor. I subsequently learned that this was provided on the strength of an instance where it appears such openings were provided, and it was noticed the boys did not progress so well after they had grown above this height, the idea being that the air in the room was better at the lower level through the ventilation of the fireplace. Whether this was a fact I cannot say, but the regulation was not insisted upon when the building came to be erected.

Still there is, I think, undoubtedly in England a strong preference for the open fireplace and the open window, and no doubt there is much to be said for them, especially in small schools; in larger ones it is impracticable. At the same time, I am strongly of opinion that an elaborate system of heating and ventilation such as may be very necessary in such buildings as law courts or hospitals is not necessary in a school for healthy boys and girls. The open fireplace not only provides heat, but also a means of ventilation, and should be placed in the angle on the inner wall near the door, not on the window side, which is an outside wall, and which in such a position must place the unhappy master in a draught between the door and the fireplace. An extract can be obtained by another flue in the chimney-stack, and fresh air may be admitted at the back of the grate and from the corridor.

By this means, however, it is impossible to insure with any certainty a regular change of air in the class-room or an even temperature. All extracts which are worked by what are called natural causes are, in my opinion, unreliable, and under certain variable conditions of temperature or wind pressure, work uncertainly and sometimes even in directly opposite direction to that intended. To obtain results unaffected by these variations, mechanical means must be employed in the shape of rotary fans or other contrivances to move the air by either extraction or propulsion. If extraction is adopted, probably the best plan is hot-water radiators under the windows fitted with bafflers, behind which the fresh air admitted from outside is warmed by passing over the radiators and the foul air is mechanically extracted at the ceiling level in the wall opposite. By this means, and with regulators on the inlets and outlets, the system can be sufficiently regulated, but it is as well also to supply an open fireplace, though the mechanical extract may interfere with its draught at times. The size of both the inlet and outlet depends upon the power of the fan employed.

The alternative is the propulsion of warm air into the room by a fan, the air being admitted into the room about two feet below the ceiling, the outlet being at the floor level into the corridor immediately below the inlet over. The advantages of this system are the more equal distribution of the heat throughout the room, the absence of all heating apparatus, such as radiators, in the room, the avoidance of draught, the air in the room being under slight pressure, and the case with which the apparatus can be used for ventilation purposes in summer time. The system requires to be planned with the building, and cannot, therefore, well be applied to old buildings.