

cubic feet of air per minute is the lowest estimate at which an individual can maintain that purity of blood essential to mental and physical vigor, and that in mixed assemblages, when some are diseased and some uncleanly, ten cubic feet per minute should be supplied. Since it is hardly practicable to have such a rapid circulation as to entirely change the air every minute, sufficient space must be allowed to permit a slower circulation without poisoning. For one hundred pupils, then, a building sixty feet long by forty feet wide, with a height from floor to ceiling of not less than ten feet, will not, if well ventilated, furnish too much of "the breath of life."

LIGHT.

Let there be abundance of light, desks being so placed in relation to windows that light will come from behind and from the left side of those at study.

DESKS.

Desks should be placed so near each other in the rows that pupils can write without leaning forward in their seats. It is better to have rows quite near each other than near the wall. The height of the seats should be adapted to the size of the pupils.

ROOMS.

Let us now sub-divide our house into rooms and our school into departments.

Since little children need more personal attention in getting a start than older ones who have learned to study from books, to write, etc., we will allow fewer pupils and classes in the primary rooms.

We will suppose there are twenty-five children beginning school and beginning the first reader. To these two grades we will assign a room twenty-five feet by twenty feet. A room of the same size we will set apart for an equal number of children finishing the first reader and using the second reader.

This leaves a room forty feet by thirty feet—making no allowance for subtractions which vestibules and closets will require—to be used by the fifty pupils from the third reader grade through the common school curriculum. If the number of recitations be too great for one teacher, the little ones may be dismissed earlier, or at times supplied with "busy work" and recitations from the higher room, conducted by the primary teachers.

TEACHING AIDS FOR LOWER ROOMS.

At the top of each desk in the lowest room should be strung a wire with ten moveable wooden beads or balls upon it, and over the desks in the second room wires with one hundred balls.

Each room shall be supplied with black-boards and a moulding table with clay and sand. Suitable charts should be supplied to each, and such Kindergarten material as can be afforded. An important item is a supply of other readers of the same grade as those used, that a variety of pictures and reading matter may be presented to keep up interest until the learner is fitted for a more difficult book.

VENTILATION AND HEATING.

In the center of the ceiling of each room there should be a flue a foot square open through the roof, to carry off the heated ascending current of impure air, and even with the floor at one side in the wall should be a grating for the exit of the heavier carbonic acid gas. In the main room the central flue should be larger, and two such gratings provided.

There are many devices in connection with patent heating apparatus to secure the ingress of pure outer air, to drive out the impure and supply its place with pleasantly warmed air in cold weather; and such air arrangement, if successful, is the acme of perfection.

If stoves in the several rooms are relied upon for heating, pipes from without may discharge currents of cold air directly under the stove, which must be surrounded by a "jacket" of zinc-covered wood, reaching from the floor to a few inches above the stove. The outer air will become warmed by the stove, and, rising, will diffuse itself over the room. This is much safer and pleasanter than ventilation by window in cold weather.

If the aid of windows is needed, let a strip be placed under the lower sash, elevating it sufficiently to allow the passage of air in the middle of the window where the two sashes slip past each other. This current entering obliquely will not be so dangerous to those sitting near the windows as direct currents from the top or bottom of the windows. Thermometers at several points in the rooms will furnish more reliable tests of the temperature than the variable sensations of teachers or pupils.

JANITOR INDOORS.

The fires, buildings and grounds shall be in charge of a trusty janitor, and it would be well to refer the question of the state of the air to his senses from time to time, as one entering from without is much more sensible of the exhausted state of the air and its offensiveness than those suffering from its malign influence.

The rooms should be thoroughly swept and aired at the close of each day, and carefully dusted and made comfortable in temperature at the beginning.

HATS, WRAPS, ETC.

The entrance for the small children should be directly to their schoolrooms, and boys and girls may enter together. It will be found better that their hats, etc., should be deposited in the schoolroom, where the teacher can look after them, than hung in halls or closets.

The large room should have an entry on either side provided with hooks and shelves. Boys and girls should not enter together, and they should leave their wraps in the place provided.

AIDS TO TEACHING IN THE HIGHEST ROOMS.

The highest room should be amply provided with black-boards and with charts—musical charts, botanical, geological, anatomical and other charts; maps and globes, uni-

bridged dictionary and other works of reference, with at least a small library of standard authors. I do not include a laboratory for scientific work nor an equipment for industrial training, for I think in most school districts scientific experiment and technical training must be of the simplest and most elementary description, depending upon the ingenuity and co-operation of teachers and pupils, rather than a complex and costly outfit. A cabinet, however, should be provided to which pupils should be encouraged to contribute specimens and collections.

Upon a recent visit to Los Angeles, California, I was much pleased and interested to observe in the exhibit furnished by the public schools to the Chamber of Commerce, collections of insects classified and named, herbaria and other things, showing the work of the pupils in natural history.

MUSIC.

A musical instrument for each room is desirable. If only one can be afforded, it should be in the highest room, and if none can be provided, yet music should not be neglected. Calisthenics and various "drills" are greatly facilitated by instrumental music, but can go on without it, while the cheer and culture of vocal music are within the reach of all.

YARD, OUTHOUSES, ETC.

Descending to the yard, let us note some important points.

From the rear of the house a high and close fence of boards should extend to the rear fence of the yard, which should be of the same description to furnish some degree of privacy even in a small yard.

The retiring places for the opposite sexes should not be under one roof nor contiguous, with but the fence and partition between, and whatever may be said audible; but should be at some distance from the middle fence. These closets should be double, one side being fitted for the little ones, the other for the larger.

In no case should they be placed over a vault or pit dug in the ground, soon to permanently poison the soil, the air, and very possibly the water supply.

If in a city with a complete system of sewerage, it is needless to speak of this, but in town and country not thus provided an even better arrangement is possible and entirely practicable.

The back of each closet should be at the lower part, a hinged door opening upward. Zinc-lined boxes should be provided to slip in and out through these doorways, and they should be emptied and sprinkled with dry earth every few days, as required.

Of all disinfectants, dry, pulverized earth is the best, but can hardly be provided in sufficiency for a large school, and chemical disinfectants should be used as needed.

In large grounds laid out for the beauty, the high fence may be dispensed with, and trellised walks may lead off in different directions to the closets suitably screened from prominence.