THE RURAL SCHOOL-HOUSE AND EQUIPMENT

With Special Reference To

COCHISE AND PINAL COUNTIES, ARIZONA

And

(Adaptable to Chinese Conditions)

By

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FOREWARD

The one-room country school is the oldest and the most primitive type of school in this country. More than half the school children of the United States are educated in rural schools. The country-school child needs a healthful environment quite as much as the city child and even more. Neglect of anything essential for health in construction, materials, arrangement, and equipment of the rural school building is an educational sin of omission, if not a social and civic crime.

Looking into any county of any state the cheap, cheerless and insanitary school houses are the prevailing type. As the district school is the only building in the community that belongs to all and reflects the prevailing civic standards, it is highly proper to require that this building shall be constructed with appropriate regard for beauty and fitness and for educational efficiency.

The purpose of this study, therefore, is to try to point out some of the existing conditions regarding the rural school-house in these two counties in Arizona and to stimulate the school officers and the general public for future improvement.

For material help and general suggestion, I wish to thank Dr. A. O. Neal, Professor of Rural Education in the University of Arizona. The Course on Rural Problems I had under him last semester was one of the very best courses I had in my year's study in this country and has led me to choose this subject for my Thesis.

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Part I. Present Existing Conditions

Chapter I.

Why and How this Study is made?

Two distinct purposes are in mind in the preparation of this Thesis. The first one relates to the importance of rural education in this country. There are in the United States at present approximately 215,000 one-room rural schools under the district form of organization and control, and approximately 12,000,000 children are receiving daily instruction in these schools. This alone is a significance. These schools are the oldest, the most primitive type, and always need the greatest care in every way. This study has been made in a number of other states, but nothing of the kind has been attempted in Arizona. Therefore the object of this study is to bring out some of the existing conditions in the rural school-houses in these two counties which are typical in the State, Comparing them with those in other states, and thus stimulating the public and particularily the school officers for future improvement.

The second purpose is to consider how we can apply these things to conditions in West China in regard to rural school-house improvement. My four year's experience as one of the Secretaries of the West China Christian Educational Union has revealed to me that one of our outstanding urgent needs there is this question of school building and school sanitation, even much worse than conditions in this country. So it is my earnest hope that this will be put into Chinese, particularly Part II, and published when I go back this year for our use there among the 400 schools scattered in a territory as big as the whole of France. Advanced equipment and unnecessary things, such as the drinking fountain and the heating system, etc, are avoided and throughout the whole course, things considered here are practical and adaptable to our conditions in West China.

In regard to the question as to how this study is made, the following methods are engaged:-

1. Personal Observation. I had the opportunity of going out to visit a number of the rural schools in this county. Altogether nine such schools were visited, five in the Post Project and four between Tucson and Nogales. Almost a whole week was devoted to these visitations, and I learned many other things about rural education and rural life in this country besides those things I observed for my Thesis. I have also visited three or four schools in Tucson, but these are city schools. These personal observations give me a very vivid idea as to what the rural schools are like in Arizona.

2. QUESTIONNIRE METHOD. This method was used because it gives us information about all the rural schools in these two counties, and from this wider range we, can draw a better conclusion as to what the average school is like. There are altogether 85 schools in these two counties, and questionnire blanks were sent to every one of them in a printed form. About 30 questions were asked in the order of the table of contents of this Thesis. After 10 days returns were received from 54 of them (63%) Blanks were sent out for the second time to those who did not answer, as a result of this, 12 more answers were received. The total number of schools reported is 66 (77%) which is considered a satisfactory per cent for this method. Both times, return envelopes and stamps were provided; otherwise the result would probably not be so good. The results of these reports are summarized in the next chapter.

3. REFERENCE READINGS ON THIS SUBJECT. Besides the time given to the practical observation and the preparation of the question blanks and the tabulation of the returns, etc. the rest of my time in the months of February and March is drvoted to readings on this subject. The list of bibliography is given at the front page.

4. EXPERIENCE IN CHINA. It should be repeated that this study is to be applied to our conditions in China. Particularly in Part II, those considerations for future improvements are discussed in the light of what we now have and what we can do in the future.

CHAPTER II.

SUMMARIZED RESULTS OF THIS STUDY

I. SCHOOL GROUNDS

1. Size of G rounds	Schools	%
Less than 1. acre	4	6
1 to 2 acres	23	34
More than 2 acres	24	36
Not answered	15	22
Total	66	100

2. Location of Building in the Plant		
At the center	25	37
At one side	19	28
Not answered	22	33
Total	66	100

3. ~~Location of Building in the Plant~~ Character of soil.		
Loam	14	21
Gravel	35	53
Sandy	12	18
Rocky	5	7
Total	66	100

II. SCHOOL HOUSE

1. Material of Construction		
Adobe	16	24
Wood	38	57
Brick	6	9
Cement	4	6
Stone	1	1
Tent House	1	1
Total	66	100

2. NUMBER OF CLASSROOMS	SCHOOLS	%
One	50	75
Two	8	12½
More than two	8	12½
Total	66	100
3. OTHER ROOMS		
Cloak room	29	44
Hand-work room	3	4
Store room	6	9
None	24	36
Not answered	4	6
Total	66	1000
4. METHOD OF LIGHTING		
From one side	12	18
From two sides	35	53
More than two sides	16	24
Not answered	3	4
Total	66	100
5. Method of Ventilation		
Windows and doors	58	87
Other device	8	12
Total	66	100
6. Proportion of window glass surface to floor area		
Less than 1/10	16	24
Less than 1/5	26	39
More than 1/5	8	12
Not answered	16	24
Total	66	100

7. Colors of walls, floor, ceiling, etc.	Schools	%
Satisfactory	3	4
Passable Color	29	44
Unsuitable color	8	12
Unpainted lumber	26	39
Total	66	100
8. Toilet		
Satisfactory	6	9
Passable sanitary	42	63
Insanitary	18	27
Total	66	100
III. EQUIPMENT		
1. Character of Blackboard		
Good	26	39
Fair	33	50
Poor	5	7
Not answered	2	3
Total	66	100
2. Height of Blackboard from floor		
Less than 2 feet	7	11
More than 2 feet	54	81
Not answered	5	7
Total	66	100
3. Desks and Seats		
Adjustable	15	23
Non-adjustable	51	77
Total	66	100

	Schools	%
4. Library, Charts, maps, etc.		
Good	24	36
Fair	21	31
Poor	18	27
Not answered	3	4
Total	66	100
IV. Play-Ground		
1. Amount of Space		
Less than 1 Acre	17	25
More than 2 acres	38	57
Not answered	11	17
Total	66	100
2. Location in the Plant		
All around	23	35
At one side	16	24
Not answered	27	41
Total	66	100
3. Play Apparatus		
Good	2	3
Fair	21	32
Poor	20	31
None	21	32
Not answered	2	3
Total	66	100
V. Garden and Demonstration Plots		
Yes	1	1
None	64	97
Not answered	1	1
Total	66	100
VI. Teacherage		
Yes	15	23

	Schools	%
None	51	77
Total	66	100

VII. Hygienic Conditions

1. Water Supply

Sanitary	39	59
Insanitary	25	38
Not answered	2	3
Total	66	100

2. Methods of Sweeping and Dusting

Good	11	16
Fair	27	41
Poor	19	29
Not answered	9	12
Total	66	100

3. Testing of Pupils Hearing and Vision

Once a term	19	29
Once a year	20	30
No test	24	36
Not answered	3	4
Total	66	100

4. Students Medical Records

Once a Term	14	21
Once a year	14	21
No record	28	42
Not answered	10	15
Total	66	100

CHAPTER III.

HOW DOES ARIZONA COMPARE WITH OTHER STATES?

Sometime ago the United States Bureau of Education has made some investigation on rural schools in 18 different states, and in each of these states two typical counties were chosen to represent the state. The states studied are Alabama, Arkansas, Colorado, Indiana, Maryland, Minnesota, Missouri, Montana, Nebraska, N. Carolina, N. Dakota, Oklahoma, Pennsylvania, S. Dakota, Tennessee, Texas, W. Virginia, and Wisconsin. These states represent practically the typical conditions the country over, and the study brings out the fact that there is less difference between rural schoolhouses in the states mentioned than might be anticipated. It will be worth while for us to compare these states with Arizona and see where it stands.

GROUNDS

In these 18 States, about 58 % reported less than 1 acre, and 22% had only ½ acre or less. In these two counties in Arizona, only 6% reported have less than 1 acre and 36% have more than two acres. It seems foolish to expect any sort of worthy teaching of agriculture to emerge from the district schools unless they are furnished more ground for their needs. With regard to the character of the ground, 20% in the other states are situated on rocky and gravel land, while in Arizona, 53% are such. Our conclusion is that as Arizona is a desert, the school ground is larger than others, but are located mostly on gravel lands.

BUILDINGS

As to the material of construction, there are 91% wooden buildings in Arizona. In regard to lighting, there are 2% in the other states received the light from one side as against 18% in Arizona and 70% received from two sides as against 53% in Arizona. But in Arizona, there are 24% that have less than 1/10 as much glass area in the windows as floor surface within the room, while there are only 14% in the other states. To sum up

investigation of the lighting problem in both cases show that windows are often wrongly placed and that insufficient glass surface is furnished. The rural schools receive only about one half the light they should, and that even this light is improperly distributed.

WATER SUPPLY

In the other states, about 78% have to depend on springs and wells outside of school grounds and 21% depend on carrying water from a distance. In Arizona, 59% have springs or wells either on the grounds or outside and are considered passable sanitary, and 38% depend on carrying water by the teacher or by pupils in buckets from a distance more than one-quarter mile from the school house. The common drinking cup is still in use in many of these schools.

TOILET FACILITIES

In these two counties in Arizona, 9% are said to be satisfactory, 63% are passable sanitary, and 27% are insanitary. The figures in the other 18 states are these: Out of 1, 276 replies examined, 50 schools have no toilets at all; 52 have only one: and the rest or 1, 174, have two. Nearly half have no pit. Not 20 in the whole number are protected against flies or can be cleaned with any sort of success. The toilet facilities of the rural schools are, generally speaking, not only a disgrace but a menace to public health and decent morals.

OTHER ITEMS

In both cases, the blackboards are set 3 feet above the floor which is too high for the primary classes to use properly.

In the other states, of 1, 258 schools reporting about one fourth of the desks are adjustable while in Arizona 23% of the desks are adjustable.

The two things that Arizona needs most are the school garden and the teacherage. Out of the 66 schools reporting, 97% of them have

no garden or demonstration plot of any kind. There is hardly any tree, flower, or shrub on the grounds except the bare looking school house. This is due to the lack of water and the nature of soil in this state.

Of the 66 schools reporting, 77% made no provision to accommodate, the teacher. The other 23% although reported the teacher lives on the school grounds, but it is not a teacherage in the proper sense of the word.

PART II. POSSIBLE FUTURE IMPROVEMENTS
CHAPTER IV.

SCHOOL GROUNDS

1. SIZE OF GROUNDS

The minimum amount of land for a school building of not more than two classrooms is two acres, and for a school building of three or more classrooms, five acres. If the plant, however, is to include a teacher's home and a demonstration plot, at least ten acres should be acquired. In rural communities the average sized district represents from one to three acres. Such an acreage is almost too small when considered in connection with modern educational facilities.

A good modern school site should be such as to comprise sufficient grounds to provide for(1) Some ornamentation of shrubbery and flowers. (2) A good sized playground for boys and girls and (3) School gardens and demonstration plots.

In view of the fact that the price of land is increasing so rapidly it is advisable for schools to be located on larger areas than present needs may seem to demand. The average price of land has been more than double during the last ten years and will probably continue to be so.

II. LOCATION OF SCHOOLHOUSE

Ordinarily the school building should be placed near to the center of the district or the center of population as other conditions will make possible. But when other more important demands are in conflict with this it is then wise to consider these other first. It's far more important, for example, to have well drained school grounds, where the opportunity for securing a sanitary water supply and toilet system is good than it is to give preference to a location nearer the center of the district where these sanitary necessaries are not readily supplied. In good weather a walk to school of a mile and a half furnishes excellent exercise, teaches the children to be self-helpful and courageous, gives them strength

to resist the effects of ordinary exposure to wind and rain and is usually of greater value in general physical training than all the unnatural calisthenic exercises the teacher can devise.

Too often the site on which the rural school is located is unsuitable to modern educational needs. Thrift has ever been a rural virture, and rural schools have usually been located on small corners of land which were useful for no other purpose. When rural learning was all book learning such sites sufficed fairly well, but a rural school of the type we now need can no longer use such a site.

In selecting a site for rural school, the following things must be taken into consideration,

1. A wet, swampy piece of land must be avoided in all cases. It is not only a muddy and dirty place, but also intruduces dangers from ground air and moisture that will always prove troublesome and unwholesome. It is hard to heat the room and harmful to the health of the children. The harm is usually greater than is ordinarily supposed. To go to the other extreme and select a high hill or a wind-swept place for the location of school building is also an error. What is needed is a location comparatively level, but so situated that it can be easily kept dry.

2. A sanitary and abundant water supply is another factor to be taken into consideration in selecting the site, we must not depend upon a running spring or a neighbour's well. Spring water may appear very clear and yet be unwholesome and risky for drinking purpose. If a site is selected with the idea of depending upon a well for drinking water, it is important to take note of any possible chances for seepage into the well. Generally speaking, a gravelly or sandy loam into which a well can be driven to a sufficient depth to prevent any surface contamination is preferable.

3. The school should be as nearly free as possible from disturbing influences. No site should be selected for a school building too close to an electricity or steam railway, manufacturing house, or any noisy industry. Such a location offers opportunity for the introduction of a

great deal of smoke and dust into the school-room. There is always great temptation for children to walk or play on the car lines, and this naturally gives useless danger. The chief difficulty, however, is the noise.

4. It is generally better to select a site with a frontage to the north or south, so that the building may be planned with the short side facing toward the roadway and the long sides toward the east and the west. Such a site makes it easier to play the building in general appearence and with reference to light. It should always avoid light coming from south or north. Many rural schools located in valleys are much more seriously handicapped from the point of view of illumination than the average school man is conscious of. This will be considered more fully under the heading "method of lightning" in the next chapter.

5. In applying these principles to Chinese conditions, it should be remembered that in China most of these rural schools are located in little villages rather than out in the open fields as they are here, under such circumstances, it is always better to build the school a little behind the houses on both sides of the streets so as to be able to expand to meet modern educational needs rather than to be in the midst of houses.

6. The selection of the school site must be made at the majority vote of the people rather than by the Trustees themselves alone. Best of all is to consult the county or the State School Superintendent.

3 Character of Soil

In order to make attractive school grounds, it is necessary to have deep rich soil where flowers, shrubs, and trees may be propagated in abundance. The school should be built on good soil, adapted for the cultivation of any or all kinds of plants or grain ordinarily grown in the neighbourhood. To select a poor, sterile, rocky soil, or a streak of clayey soil where nothing can be raised, would be a mistake, though well situated with reference to other requirements. On such ground no teacher can make a

showing in agricultural experiments as would attract the favorable attention of the farmers in the community.

There is very little choice in regard to soil in Arizona because the whole state is more or less a desert. Even then there are some parts where water supply is easy and the school ground can be made more beautiful than they are at present if the Trustees would only give a little thought to it.

CHAPTER V

SCHOOL-HOUSES

The district schoolhouse is the only building in the community that belongs to all, so it is important to express through it the highest attainable ideals of beauty and fitness. A beautiful country school building will exert a quiet but persistent educational influence on all who are associated with it, in school or out. It gives the community something which the people can be proud of. All who see a beautiful and appropriate school are inclined to be more loyal to the cause it represents and less satisfied with ugliness anywhere. Beauty is more than economical, it is educational in the highest sense. It is neither for the rich nor the poor, but for all. It does not always mean expensive. A log house can be made beautiful. On the other hand, there are expensive schools that are still ugly. It is justified to hire a worthy architect to make the plans first.

1. MATERIAL OF CONSTRUCTION

The material of construction will vary according to local needs and climatic conditions. In Arizona where the rain fall is so small and a large part of the year is dry, buildings can be built less expensive without much consideration in regard to the heating system. In China, many houses do not need heating at all, so the houses are built with wood, bamboo, and earth. The pillars, posts, and the lower part of the wall are all wood, and the upper part of the wall, is made with bamboo inside and plastered on top with mud and lime. The roof should always be wood and covered on top with tiles because there is always heavy rain in the summer in China. Such a structure will be cheap, yet answers the needs satisfactorily. Stone and brick buildings are of course much better, but they are far more expensive and many city schools even can not afford that. There are no cement buildings in China.

2 CLASSROOM

Here we are coming to the central point of our whole subject. The classroom should be the unit of consideration in planning a schoolhouse.

The size of the classroom in a district school should vary to suit the number of pupils of school age in the district, and more especially the probable number attending school. There should lie at least fifteen square feet of floor space and 200 cubic feet of air space for each pupil. So a room 32 feet long and 24 feet wide will accommodate 40 to 45 pupils by placing 5 rows of desks and 8 to 9 desks in each row.

The height of the classroom of this size need not exceed 12 or 12½ feet from finished floor to finished ceiling. If the building is located on a lot which will permit the lighting of the classroom from either east or west and there are no obstructions from tall buildings, high hills, or forest trees, 12 feet will be quite sufficient. This will save a good deal of expense, and is just as good as a building a foot higher.

The width of the aisle next the windows would be approximately 2 feet; the aisles between the rows of desks 18 inches wide; the space behind the last desk in each row 3 feet; the space between the inner wall and the first row of desks approximately 3 feet; and the space between the first seat in each row and the front end of the room would be about 8 feet. This location of desks insures good lighting and will give sufficient space about and between the desks to manage the classes without confusion.

The floors of every country schoolhouse should be made double with some deadening material between them. This is necessary primarily to prevent the floors from being cold, and to exclude the possibility of the entrance of ground air. The best material for floor is a good quality of white oak, well seasoned, in boards not more than 3½ inches wide, tongued and grooved, and blind nailed or screwed. If it is impossible, on account of expense to use oak, hard pine will make an excellent floor. Both kinds of wood are plenty in China. Before the floor is used it should be treated with hot linseed oil, and then, after it is throughly dried, it should be waxed. The oil will fill the pores and prevent it from shrinking, and the wax will give it a finish so that it will not mar easily nor hold the dust.

3 OTHER NECESSARY ROOMS

A. WORKROOM. All schoolhouses, including those for one-teacher schools as well as those for the consolidated type, should have at least one work-room where manual training, domestic science, agriculture and other related subjects can be taught by laboratory method. This is not a luxury, but an absolute necessity. As the majority of the district schools are small, so one work-room can accomodate both boys and girls if the work is alternated. Here the pupils can apply their arithmetic and drawing to real problems. They can make useful articles and other things either for the school or for their homes. When a separate room is provided, much of this work can be done while other classes are reciting. It offers an excellent opportunity to develop initiative and self-reliance on the part of the pupils who are working out of the sight of the teacher. Play apparatus and tools for the school gardening can be stored in this room. The easiest way to provide such a work room is perhaps to make the calssroom a little longer and shut the lower end off by some sort of a movable wide door, so that the workroom and the regular class-room can be made into one large room for social meetings in the community and other similiar occasions if so desired.

B. CLOAKROOM. All district schools should have a special room where children can hang up their wraps and place their lunch baskets in safety. Two separate ones for boys and girls would be better; but if a single room is properly furnished, it will serve the need. It is bad to hang wraps on hooks on classroom walls because it prevents the use of these walls for blackboards, renders the room unsightly, contaminates the air with odors from damp or soiled garments, and absorbs some of the light in the room, it is also dangerous because of infectious diseases. The teacher can not make the room attractive when all kinds of wraps are hung upon the walls and it also gives her so much trouble when umprellas or over-shoes are lost. This cloak-room can be best located at the entrance to the classroom.

C LIBRARY AND TEACHER'S ROOM

The library itself will be considered more carefully under its proper place in a later chapter, but here we are concerned chiefly the general arrangement of this room so as to make it a Teacher's room also. As there will not be a large collection of books in most of the rural schools for a long time to come, so only a small space will be needed. A room 10 feet long and 8 feet wide will generally be large enough for both purposes, especially when the windows are corectly set and the shelves are built into the wall. This room should open only to the classroom, so as to give the teacher entire control of it and to make it possible to keep it warm from the classroom stove. A reading table and few chairs will constitute the cheif furniture in this room. The teacher can also use it as her room for part of the time for her preparation or rest. For her accommodation a small wardrobe, a washstand, and a mirro would suffice. The school supplies also can be kept in this room. A couch should also be placed in this room if possible to serve as a resting place for the youngest children and for other emergencies. Another great feature of this room is that the teacher can use it as a guest room for receiving patrons, school officers, and other guests of the community. This room alone would be too small for any social activity, but in connection with the classroom and the workroom, it would prove a place for some social entertainment.

4 METHOD OF LIGHTING

Direct sunlight is the most powerful and reliable disinfectant known, and for this reason sore dependence upon north light should be avoided, for there is very little direct sunlight that will ever enter the classroom if the windows are placed on the northern side. Windows facing toward the south would be equally unsatisfactory. Our dependence, therefore, should be upon either east or west, preferably the former.

This will permit the morning sun to take the chill out of the room before school begins. In buildings with east exposure, the troublesome direct rays from the sun will have disappeared early in the morning and the shades can then be rolled up for the rest of the day.

Unilateral lighting is recommended in all locations. The value of one-side lighting is not yet understood by the majority of the people, so many communities are apt to disregard this requirement. This one-side light should preferably come from the left side of the pupils when seated at their desks. If the light comes from the right, the shadows of the pupil's hand and pen will give him constant trouble when he is writing. Children suffer more from such disturbances than older people, because their eyes tire more quickly and their attention is more easily distracted.

Suppose we consider a schoolroom with east and west exposure, with the same number of windows on each side, located in the same relative positions. In such a room, there are always two shades of light one is stronger than the other. So at any time of the day there are always two shadows of the pen and the hand when the pupils are writing. These shadows are of equal intensity only at the shifting line of equal light. Under such conditions, it is impossible to seat all the pupils in a school-room without imposing some slight hardship on all and a serious hindrance on something less than half of them.

Few of us realize the fact that light coming directly from above the desks introduces more disturbing shadows than that coming from the right side. For this reason ~~above~~ lateral lighting is generally preferable to sky lighting in school rooms.

Other rooms, such as cloak room, work room, library, etc. will receive separate treatment because there the unilateral lighting is not an important element. Cloakroom and toilet will require direct sun light so as to keep them sanitary, but work room must be different as there it demands individual convenience in arranging tables and other furniture.

5 METHOD OF VENTILATION

If the interior air in which the pupil must live be vitalized properly by the pure oxidized elements from without, his nervous system will withstand the greater shock of the intensified mind concentration. From this we deduce the fact that ventilation plays a very important part in schoolhouse construction. To secure this ventilation, there must be a steady stream of fresh air coming into the room, and an equal sized out going current of foul air. As foul air contains carbon dioxide which is slightly heavier than the air itself and gravitates toward the floor, so to make a ventilating system effective, it becomes necessary to remove the foul air from the lower strata of the room and at the same time let the fresh air coming in from above. The simplest and the most effective means of obtaining a current of warm and fresh air and of removing that which has become vitiated, is by means of a jacketed stove with a ventilating flue.

In west China where the climate does not necessitate a stove in the schoolroom then the easiest thing to do is to have one or two wide and short small windows on the right side wall close to the ceiling and opposite to the lighting windows at the left. The writer has seen this worked out effectively.

6 WINDOWS

The light should come from only one side, the left, and the surface of the windows should be two fifths the size of the floor space of the room to be lighted. Low windows and wide rooms cause a reflection and refraction of light rays very harmful to the eyes and should, therefore, be avoided for classrooms. The top side of the window should almost reach the ceiling so that the air in the upper part of the room can be quickly ventilated. The height between the floor and the bottom of the window should be about two feet. In this way, the children who sit in the first row next to the windows will not suffer the shadow, and at the same time they can not be interfered by outside disturbances when they are on their seats as they can not look through the windows.

In order to provide the best light the windows should have as little space between them as possible. It is better to use sash containing a number of small panes because the added strength lowers the possibility of accidental breakage. If the windows are to be used at any time for ventilation they should be hung on weights for easy operation. To prevent direct currents, window boards five inches wide should be provided for the bottom sash.

The best window shades are now made from cotton ducking. They are not opaque, but cut off the direct rays of the sun and permit a diffused light to enter. Brown, khaki and dark green are the most serviceable colors, but they should always conform to the general color scheme of the room. Adjustable shades should always be used. They can be regulated so as to exclude light at either top or bottom of the windows.

In China where glasses are so expensive, very few rural schools can afford to have glass windows. A good substitute is good oiled paper. It is transparent and will prevent rain as well as sun rays.

7 COLORS OF CEILING, WALLS, AND FLOOR, ETC.

The color scheme for the interior should be chosen with great care because it greatly affects the proper diffusion of light. Bright colors of all kinds should be avoided. Subdued colors should always be used because of the soothing effect they have upon the children's nerves. The scheme should represent harmony, should give an artistic appearance, and at the same time should aid in the lighting effect.

Cream tinting is usually accepted as the very best coloring for the ceiling. For the walls soft gray, or light brown, and buffs have received highest approval from those who have tested out. Brown is also a suitable color for the floor.

All wood work should have a flat finish to prevent reflection of light, and polished surfaces of every kind should be avoided. The entire setting of the room, including furniture and pictures, should produce an impression of harmony, simplicity, and tranquillity.

8 TOILET

The location of toilet in the country school is a troublesome matter. When dry-vault toilets or those with septic tanks are used, it is best to locate them at a distance from the school building for the sake of both propriety and wholesomeness. It is of course inconvenient to locate these necessaries outside of the school building on accout of bad weather, dangers of neglect, etc. but these are the only forms of sanitary toilets that the great majority of rural schools will be able to supply. The small size of the rural school lot makes this problem very difficult, as the location of toilet often will destroy the possibility of a fairly good play-ground. The usual location selected for these toilets are the two opposite coners in the rear of the school lot. Ever-green shrubs should be planted so as to shield the toilet and to inclose the walk leading to it.

The next requirement for outside sanitary privies is to construct them in such a manner that the soil around and underneath the school building shall be kept free from contamination. This precaution is

necessary on small lots; especially where a well furnishes drinking water.

In order to make our discussion most practical, a concrete pit is perhaps the best thing the rural communities in west China can afford to have. This is usually made out of a mixture of cement, gravel, pebbles, or crushed rock. Plastering the inside of walls with grout will make the interior smooth and more water proof. This concrete pit requires special care and should be cleaned out at regular intervals. Steps should be taken to make it absolutely fly and mosquito proof by screening openings in both ventilator and vault door and by using self-closing covers for seats. As there is no co-education in the rural primary schools in China, so one pit will serve the whole school.

Immoral and unsightly conditions in the toilet should never be permitted because of the lasting impressions they make upon the children's minds. It should be kept in first-class condition at all times. The interior must be kept well painted, and no markings or drawings of any kind permitted. It ought to be cleansed frequently with water and soap, and plenty of slacked lime applied to the vault. One of the best means of keeping such place clean is to appoint "monitor" and give him not only the instruction but the authority needed for good management. The teacher must, however, always be held responsible for good supervisions in this connection.

CHAPTER VI.

SCHOOL EQUIPMENT

1. Blackboard

The best material for blackboard in rural schools is a prepared state cement, which can be mixed and spread on as ordinary plaster. It is not expensive and will always in repair. If it is properly done, it will probe more satisfactory than any sort of manufactured blackboard in the market. It is a failure to secure a cheap substitute.

In order to determine the proper color of the blackboard many experiments have been made and it is now generally agreed that the most satisfactory color is a dull black. Blackboards with shiny surfaces, and those made of so-called stated cloth, are entirely unsatisfactory, because these are trying on the children's eyes and disturbing to their sensibilities.

As the district school usually has pupils of all the elementary grades, so the blackboards must be so placed to suit every one of them and are within the reach of them all. It is a mistake to assume that he little folks can not use the blackboard . Nobody can do good work on the blackboard in a stooping posture, and the work can not be seen readily if it is too high. The blackboard on the wall opposite to the windows should be set about-two feet from the floor to suit the average height of the children and should be $2\frac{1}{2}$ feet to 3 feet wide. If it is too wide the upper part is always unused. The blackboard on the end wall will prove more satisfactory if it is placed 3 feet above the floor and be 4 feet wide. As this space is utilized largely by the teacher's own use, so a larger and a higher board is needed. The rear end of the room may also be utlized for blackboards only when it will not make the room too dark. Blackboards should never be placed between windows or closely adjoining them; the front and the right sides will give space enough for blackboards. The disadvantage of doing this is that it will not receive sufficient light and is very hard for the children to read anything written on it.

Small hanging blackboards of about 2 feet long and 1 foot wide can be well utlized in the classroom when the teacher wants to give assignment to one group of children and goes on to teach another group. It should be made so that she can write on both sides, and can easily turn over. She can easily write these assignments on them between class intervals, so it will not occupy her time in the recitation period.

The chalk troughs underneath the blackboard should be wide enough to hold the erasers as well as the chalk, and should be deep enough to catch and hold the chalk dust droping from the brush and the board surface. Every Saturday morning, these blackboards should receive a thorough good wash which can easily be done by one or two older pupils in turn with the teacher's supervision.

2 DESKS AND SEATS

The essential thing in regard to desks and seats is that they should meet the special need of the individual child of different sizes. Different sizes should be provided for the mixed school and they should represent comfort as well as utility. The seat portion should be at such a height that the child can place his feet properly on the floor, and the desk should then be adjusted to give the right height for general use. The space between the desk and seat should be arranged to give the best bodily comfort. The child should not be compelled to strain his back muscles leaning forward in using the desk, thus forcing the organs of his body out of their natural position. The back of the seat should support the middle of the child's back rather than his shoulder or head. The child should enter the seat only from one side, the left.

Provision should be made for the storing of books. The drawer should be located under-neath the seat rather than under the desk. Inkstand should be fixed into the desk. There should also be a trough on the desk for placing pens and pencils.

For a classroom 24 feet by 32 feet with 48 pupils, there would be needed two rows of no. 5, two rows of no. 4, one row of no. 3, and one row of no. 2, single desks. The distance of one from back to back for no 5, desks should be 22 inches; for no 4 desks, 24 inches; for no. 3 desks, 26 inches; and for no. 2 desks, 28 inches. The row of smallest desks should be nearest the windows to avoid obstructing the light. There should be at least a few adjustable seats, provided of course that the adjustment is used intelligently. These desks and seats should not be fastened firmly to the floor. It is more satisfactory to have them movable both for sweeping and for using the room for other purpose at times of community gatherings.

Stell desks or cast iron desks are very expensive in China.City schools have not come to this yet, so it would be absolutely impracticable to consider it in rural schools. The common material for constructing them in China would be oak, cedar, or pine, arranged in the order of their respective expensises. On the average, it costs from $1.50 to $2.00 a piece in China.

3 LIBRARY, MAPS, CHARTS, ETC.

Every district school should have some general reference books used by the community as well as by the pupils. Where there is a teacher's room, as mentioned before, that room can be made most beautiful and pleasing as a library. The mere experience of being in a room devoted to books and reading will create a new sort of sentiment for books and develop a love for them. If this library room can be made a sort of spiritual and intellectual sanctuary for the community, its reflex influences will be seen and felt in many unexpected ways.

The selection and purchase of the books should be left to the county school superintendent rather than to the district trustees in order to avoid any waste of money and to get the right kinds of books the children will need. More supplemental reading books and textbooks are needed, and more reference books, dealing with natural phenomena, home life, and farm life, and the application of science to modern life, should be available

for use by any rural pupil. A library of 250 to 350 well selected volumes, with cases for additional pamphelets and pictures, and with provision for yearly additions and replacements, is not too much to expect for a one teacher rural school. In addition, the library of the school should be supplemented by traveling libraries, sent out from the office of the county superintendent, or from a county or state library.

Beside the books, there should also be a good collection of maps, particularily the map of the local county and state as well as a good map of the world. Charts of different kinds on animals, plants, hygiene, etc. should also be provided. The teacher will find these very useful in teaching these subjects. All these should lie well kept and cared for. Shelves can be built in the wall with little expense. A cabboard with closed doors is even better because it keeps the books away from the dust.

4. OTHER SIMPLE SUPPLIES

The rural school as well as the city school, needs teaching apparatus. A simple list of these will be the teacher's desk and chair, a good clock, a good globe, good illustrative material for primary work, a flag, a work-bench for constructive work, molding clay, supplies for nature study work, sand boards, germinating trays, flower pots, a glass aquarium, and possible an organ. Practically all these can be provided in rural schools in west China. Playground materials etc. will be considered under different headings.

CHAPTER VII

PLAY-GROUND

1. It's need and Importance

Play is necessary to good school discipline and to mental concentration during the working hours. It is not a luxury, but a necessity, it is not something that a child likes to have, but it is something he must have if he is to grow up. It is more than an essential part of his education; it is an essential part of the law of his growth of the processes by which he becomes a man at all. Many immoral practices would be spared if provision were made for healthful sports.

2 SPACE AND LOCATION IN THE PLANT

In rural communities, the average school site represents from one to three acres. Such an acreage is almost too small when considered in connection with modern educational facilities. So it is hardly possible to set any arbitrary standard for the size of the play-ground, but it should be large enough for base-ball, tennis, basket-ball and free open play. While every play ground should have some apparatus, the smaller the ground, the greater the necessity for a goodly supply.

This field should be placed on one side of the building, where the flying ball will not strike the unsuspecting child who is otherwise engaged, or to break the glass of the window. The allotted space should be large enough to prevent the flying ball from going across into the neighbour's grain-field or meadow. This has often been the cause of unwholesome contention. Young children choose different kinds of sports, and so the entire school grounds should be laid off in a manner to give the very largest possible advantages for individual physical development. The proper placing of buildings adds very much to convenience and to the attractiveness of the grounds, and so should be carefully regarded at first in the plan.

Climatic conditions vary greatly throughout the country, and in general, there is the need in some schools for an open school gymnasium. At certain seasons out-door sports ought to be encouraged; but there are rainy days, stormy days, and cold days when the children need protection from the weather, during their hours of play. The construction of such a separate gymanasium should be very simple and inexpensive. It would be better to have removable sizes, which makes it usable for either pleasant or stormy weather. Simple apparatus may be provided at small cost, such as the horizontal bar, chest developers, stall bars, tumbling mats, etc. If, however, the school becomes the real social center of the district, this building will add greatly to the social advantages and so serve an important community need.

3 PLAY APPARATUS NEEDED

Play ground apparatus may be made to serve a good purpose if placed advantageously on the school grounds and its use supervised by the teacher. Sand pile, swing, running track, jumping pit, slide, giant stride, turning pole, and teeter-boards, etc. All these can be easily made and are inexpensive. The larger boys with a few tools can make much of the play ground apparatus out of waste materials brought from their homes.

The pupils of the school may be orginized into groups and allowed to choose their own censors and direct their own games. In so far as they are able to do this satisfactorily they develop independence, individuality, and leadership,--all of which are very important characteristics.

CHAPTER VIII

GARDEN AND DEMONSTRATION PLOTS

1. THEIR NEED AND IMPORTANCE

The school site should be made to contribute to moral and aesthetic training, as well as to intellectual and physical development. It is always an advantage to have children draw inspiration from their own surroundings, but in a large measure this must come through the ability of the parents to recognize such things first, and through the interest the teacher may take in making this an effective part of the educational plan of the school. We must not think that education is always something growing out of text books and school recitations. We must not ignore the fact that personal interest on the part of the child is of first importance in his development, and that this interest in the school can be increased by adding the attractiveness without to the home like influences within.

In order to make the school ground attractive, beautiful walks should be laid out, and grass and long-lived shade trees planted. Where possible, beds of flowers, climbing vines, bulbs, shrubs, and roses should be added for the education of the children and the adornment of the ground.

The children should always be called upon to assist in such work, for in no other way can they be made to feel the same personal interest in it. A child will never destroy a tree planted by his own hands. He will always foster the flowers that have grown from the seed which he brought from home. Take an interest in the flower-beds built during his leisure moments, and will always respect herbs which the school organization has chosen and propagated. Therefore, in connection with all school improvement a sense of ownership as well as a sense of personal pride should be instilled in the children of the community.

Practical agriculture should receive attention in every rural school, and this subject must be taught in a practical as well as theoretical way. The

farmer's laboratory is the field. Practical experience and observation of approved methods are essential to the proper training of the pupils. This practice demands a demonstration plot, so this need should receive a central consideration in selecting a school site. Its importance as a factor in making for efficient, productive citizenship demands it, and being one of the school subjects which has vital contact with the economic life of the home, there is little danger of too much attention given to it.

By a little judgement and effort on the part of the trustees and the teacher much can be done in this direction, though the common lack of water supply and the long summer vacation naturally interfere greatly with such development. Still such difficulties are not insurmountable. Where rural schools have been consalidated and a central school provided, with running water and janitor service, many things then become easily possible which are difficult on the little district schools.

2 LOCATION IN THE PLANT

The location of the school garden and the demonstration plot should be taken into consideration when selecting the site and in laying off the grounds. It must be remembered that early vegetables will not grow on low, poorly drained soil. Five acre sites for schools offer a minimum opportunity for a diversity of gardening and agricultural acitivties. This, however, does not allow the construction of a teacherage on the school grounds. But a resident teacher to give supervision is essential for the successful carrying on of the above activities.

The minimum agricultural area for a consolidated school plot should be three and one-half acres, the area should be so divided as to give at least 1/3 of an acre to vegetable crops, and one and one-half acre for demonstration purposes. These should be located at one side or one corner on the site rather than all around the school-building.

3 KINDS OF FLOWERS, SHRUBS, ETC.

Trees, shrubs, and vines should be used throughout the grounds where fitted,

but herbaceous plants and annuals should be restricted to school gardens. Native plants should be used as much as possible.

Among cultivated shrubs are: privet, flowering almond, snow-ball, lilace, and the several varieties of roses. Among the native vines are: yellow jasmine, honeysuckle, smilax, bamboo, wild rose, woodbine, grape, morning glory, wistaria, as well as others. These can be used for arches, or trellises. They grow quickly and are especially suitable for hiding ugly spots.

In planting flowers on school grounds, it is best to choose perennials. Use them in borders along the walks and fences, or in beds against the building.

Trees should be planted as nearly like they appear in their native environment as possible. Perhaps the most satisfactory shade trees are elm, oak, sycamore, and sweet gum, cedar, holly and pine are beautiful ever greens.

CHAPTER IX

TEACHERAGE

1. Its need and Importance

In all efforts to build up an efficient rural school the teacher must not be forgotten. All recent studies have revealed the lack of training, immaturity and short tenure of rural teachers. In part the short tenure is due to the unsatisfactory and often almost impossible living conditions which rural teachers are called upon to put up with. The natural result of this is that they either go to the town or change to some other work. Only as we create conditions which will attract well-qualified teachers to rural service can we hope materially to improve the district schools.

The school is a public institution and the teacher is a public servant. He should, therefore, live in the community twelve months in the year and take an active interest in all welfare movements whether the school is in session or not. This can only come about when the teacher has a permanent home in the community.

From the agricultural point of view, unless rural school pupils can actually engage in experimental work in agriculture under the guidance of a competent teacher, what they learn from books will be of little practical value. And unless the teacher lives on the school grounds all the time to have charge and direct the work, it will be seriously handicapped by the long summer vacation.

The idea of providing homes for teachers is not new. Denmark and Germany have long since done so. Similar provisions are made for those employed in the government schools in Alaska and in Japan. In this country, the State of Washington has been prominent in this work, in 1915 this state had more than 100 cottages for teacher's homes. This movement has extended

especially to Nebraska and South Carolina. The good example set by these states should stimulate many others to progress in this direction.

In West China this need is perhaps not so nearly as great as it is here, because in most of the rural schools the teacher is either a high school student or a graduate and is usually a young single man. With these young, men the question of rooming and boarding is not so difficult as with young girls.

2 LOCATION AND GENERAL STYLE

While there is always an advantage in the protection of school property in having both the school house and the teacherage under the same roof, some disadvantages encountered. A teacher's home needs privacy; the school children require freedom. In general it seems better to recommend a division of the school grounds into two parts, one for the school house and play grounds and the other for the teacher's house and the experimental farm and gardens. So the best location of the teacherage can only be decided when considering it with reference to other needs and demands of the school grounds.

The cottage for the teacher should be as far as possible a model of its kind for the neighbourhood. A beautiful, well planned, and sanitary, cottage on the school on the school farm would help in a definite way to stimulate the farmers to build better houses (not more expensive ones) and to reconstruct to a degree those already built. In general, it should harmonize with the general architectural treatment of the school building and should consist of a living room, a bath room, a kitchen, a dinning room, and a sleeping porch, where possible.

3 FURNITURE NEEDED

A minimum amount of necessary furniture should also be provided in this teacherage for the teacher's convenience. A few outstanding things like bed, tables, chairs, bathtub, kitchen stove, and simple rugs, etc can be inexpensively provided. It is quite worth while to have a few good things

because they are permanent property of the school. Shelves can also be built in the walls at little expense and without encroaching much on the space available. The teacher can supply her own luxuries if she wants to and take it with her when she leaves.

CHAPTER X

HYGIENIC CONDITIONS

1. WATER SUPPLY

Every school should have an abundant supply of pure water. A sanitary well on the grounds is as necessary and important as the school building itself. The results of the investigations of water supply for country schools make, it clear that the drinking water furnished the children is often impure and dangerous.

Springs, farm wells, or carried from homes by children are the usual sources of water supply in rural schools. The springs are often poorly shielded from immediate contamination, receive the drainage from swampy ground, and they issue in open pools, these pools are depositories for leaves, dust, and dirt; insects find lodgment therein; various animals share in their use.

When farm wells are dependent on for drinking water, the school authorities rarely have any direct control over them and rarely make any investigations to determine whether wells are improperly cared for and receive infected surface drainage.

When dependence is placed on the boys to fetch the water, consequently children are often required to drink water which has stood for hours in an open bucket. Furthermore, they are not careful, and not infrequently return with a half pail of water more or less contaminated by their carelessness.

All these facts emphasize the need for a more sanitary well on the school grounds. The drilled or driven well is more sanitary than the dug well and is best for rural schools, inasmuch as it does not require cleaning and there is less danger of its being contaminated by surface water or organic matter. When a driven well is properly placed and is sufficiently deep to warrant a supply of pure water, a drinking fountain

can be attached to the pump although this would be impossible under conditions in West China. Common drinking cups should be avoided under all circumstances.

2. METHODS OF SWEEPING AND DUSTING

Dry sweeping with a broom, followed by the use of a feather duster scatters fine particles of dust and germs throughout the rooms in convenient position to be inhaled during the day. The room should be swept in the afternoon following the close of the school and doors and windows should be thrown wide open. The woodwork, desks, and other furniture should be wiped in the morning with a cloth slightly moistened with kerosene. Sweeping may be done with wet sawdust, or what is better, a sweeping compound and an ordinary broom. The use of the dustless brush containing an oil reservoir with a flow that can be properly regulated by a screw cap is probably the most satisfactory means of avoiding dust in sweeping. It should be constantly borne in mind that scrubbing, sunning and airing are better than any form of fumigation.

3 SCHOOL SANITATION

The twentieth century is marked by an awakened interest in the welfare of the children. The first step in the health programe for the school is securing an environment as free as possible from unhealthy conditions. Many of the faults in school sanitation are not within the control of the teacher, such as the system of lighting, heating, sewage disposal, and ventilation, which are often wrong in their construction. But there is a good deal can be done by the teacher to create a sentiment on attitude of the school toward health.

Every teacher should be trained to protect pupils against eye injury and eye strain in the schoolroom. Eyes are often weakened, if not ruined, by glazed paper and blackboard surfaces, lines of the wrong length, unsteady, dazzling light, and prolonged concentration.

Required home study may deprive a child of necessary play and sleep, and by so doing may aggravate the effects of harmful school environment. She should be made aware also of the effects of dry sweeping. Nor must muscle comfort be disregarded. Seats and desks not properly regulated according to a child's size frequently deform the spine and the hips, and cramp the lungs. Other things needing constant surveillance are the drinking cup, towels, and toilets.

Hygiene is not a subject, and can not be taught by talking about health alone. It is a practical force, a method and a way of living, recent studies indicate that there is even more need for health examination and hygiene teaching for rural schools than for the city schools. Since the habits of hyginenic living must lie formed in the early years of life, the school's first concern should be to make all activities of a healthful character. The work in personal hygiene in the school is primarily one of securing habits of personal cleanliness of body, teeth, and clothes; and cleanliness in handling material, eating lunch, and in the care of the desk and the room. Cleanliness of person and environment, together with clean play and vigorous work, will do much toward keeping the mind alert and the conduct wholesome.

4 MEDICAL INSPECTION

Medical inspection is a department of health education, and its object is to promote the happiness and the efficiency of the child by preserving and improving his health, it includes a careful and thorough examination of the physical condition of the children. These examinations vary in thoroughness, but in a general way may be taken to mean inspection of nose, throat, skin, chest, joints, and feet; testing of vision and hearing, examination of heart and lungs; for the five primary physical defects are poor vision, nose and throat obstructions, deafness, decayed teeth; and poor nutrition. When the normality of a child is questioned, a test of his mental powers should also be made.

If possible, the parents should be present when their children are examined. A report of the condition should be made to parents as well as

to keep it in the school for constant reference. These examinations should be made at least once a term. A monthly record of the children's heights and weights should also be kept where possible.

PART III CONCLUSIONS AND RECOMMENDATIONS

This is a brief presentation of the principal conclusions that I have come to from this study and some recommendations for future improvement. They are not complete by any means, but will probably point out to the reader in a more clear and concrete form the result of this study.

I CONCLUSIONS

1. The schools in Arizona have fairly large grounds in comparing with other states, but they need to be made more attractive by planting trees, flowers, shrubs, etc.
2. Most of these schools are located on gravel lands. Owing to the character of the soil in this State, this can not be helped in most cases.
3. In general, the windows of the schoolhouse are incorrectly placed both in regard to lighting and ventilation. More window area and unilateral lighting are needed.
4. Besides the classroom itself, cloakroom, hand-work room, store room, library, etc. are needed.
5. Toilet facilities are poor and water supply insanitary.
6. There are practically no Teacherages in the proper sunse of the word.

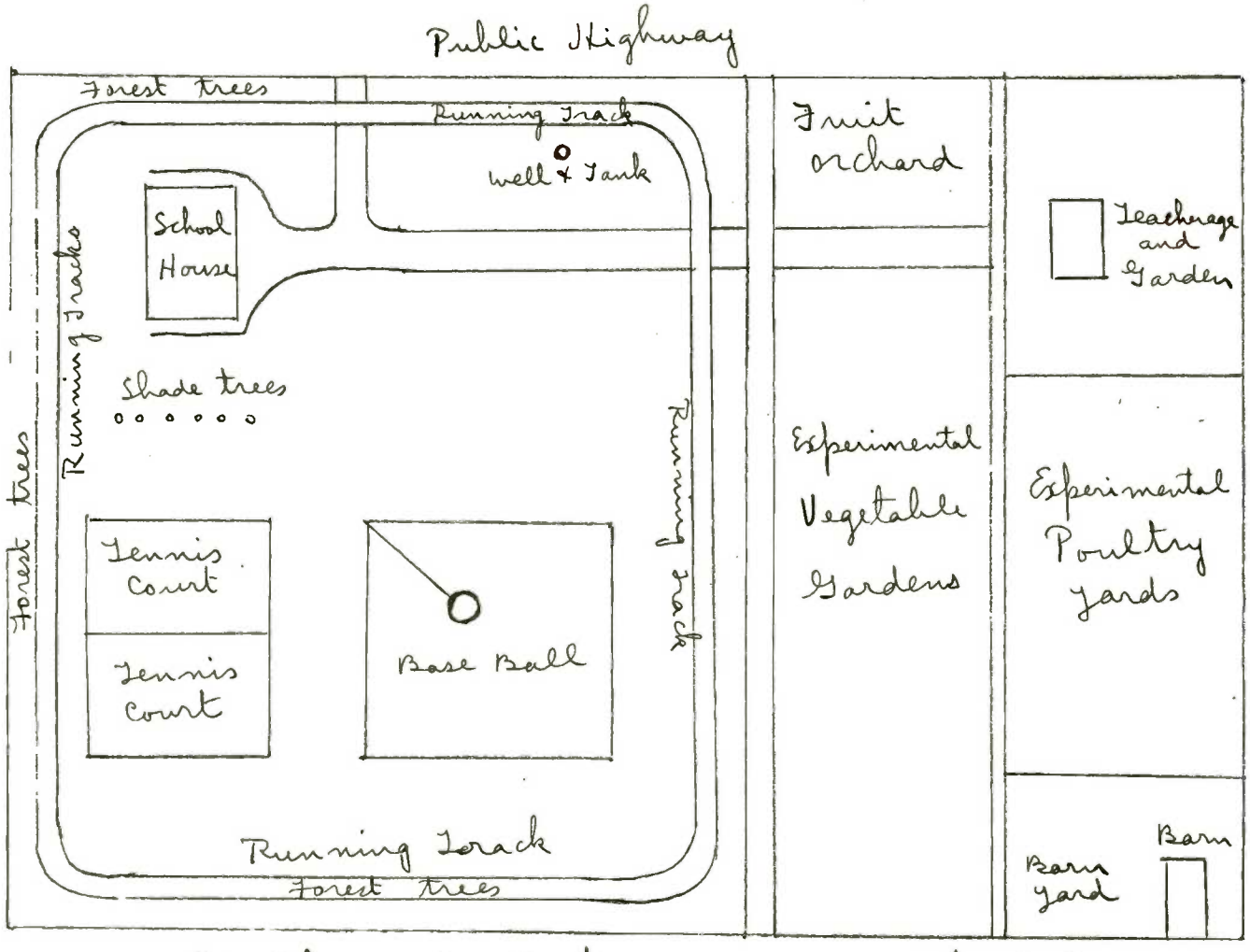
II RECOMMENDATIONS

1. Should do away with the District form of organization and control where possible, so as to have a larger area of taxation, expert administrators, better support, more efficient teachers, longer school term, and finally better buildings and equipment.
2. Consolidation is the only feasible, effective remedy for solving the rural school problem. It means when several small, weak, and poorly graded schools are united to form a strong, centralized school properly located housed, graded and taught by several competent teachers.

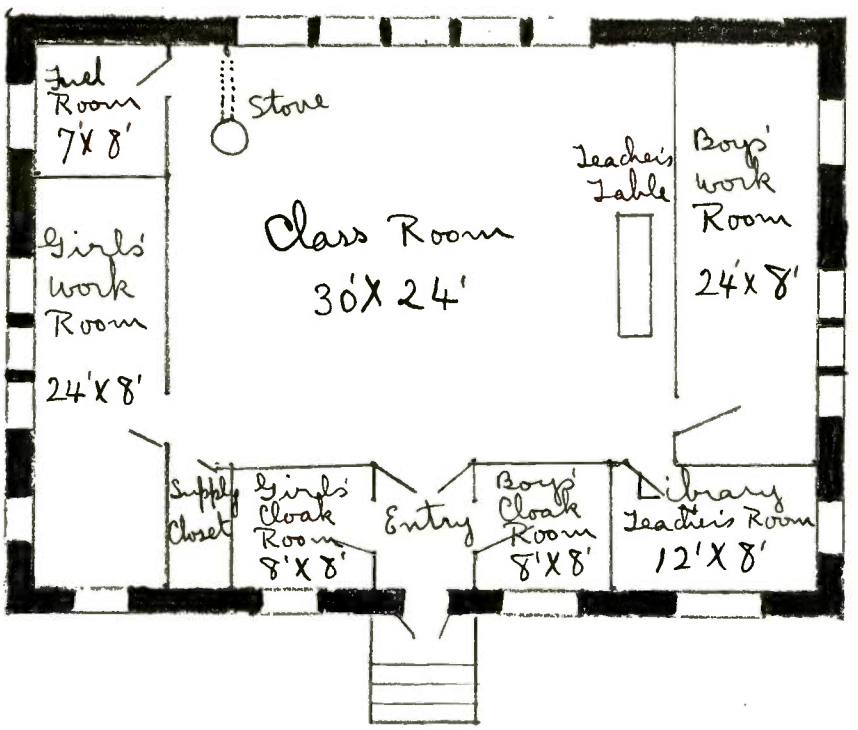
3. Each community should study earnestly its school building problem and where possible, better provision should be made.

4. The present school laws should be made more clear and applicable to modern hygienic requirements.

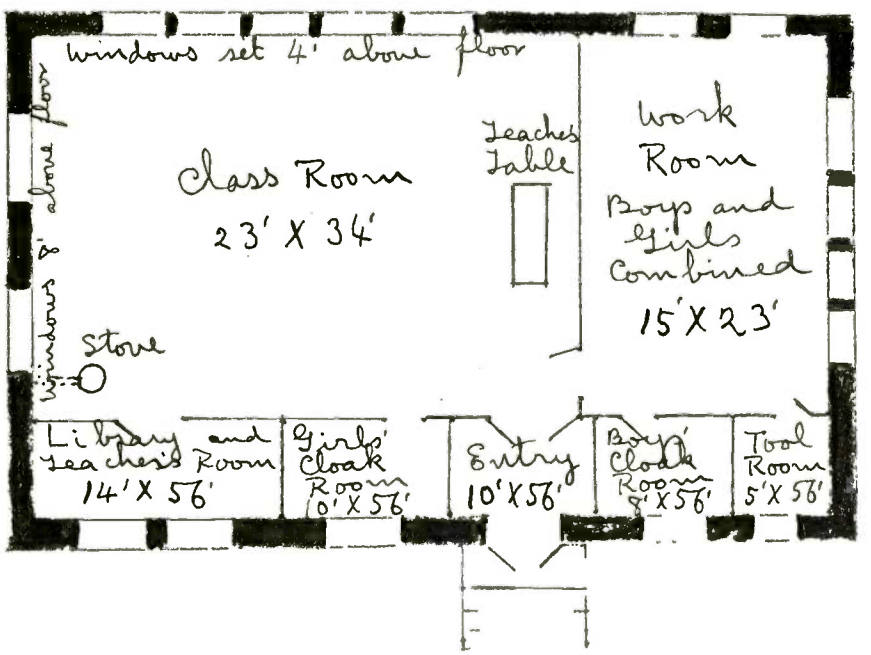
5. The State should give financial assistance to those communities that can not meet the minimum standards without undue effort and also grant a bonus to those that exceed these standards.



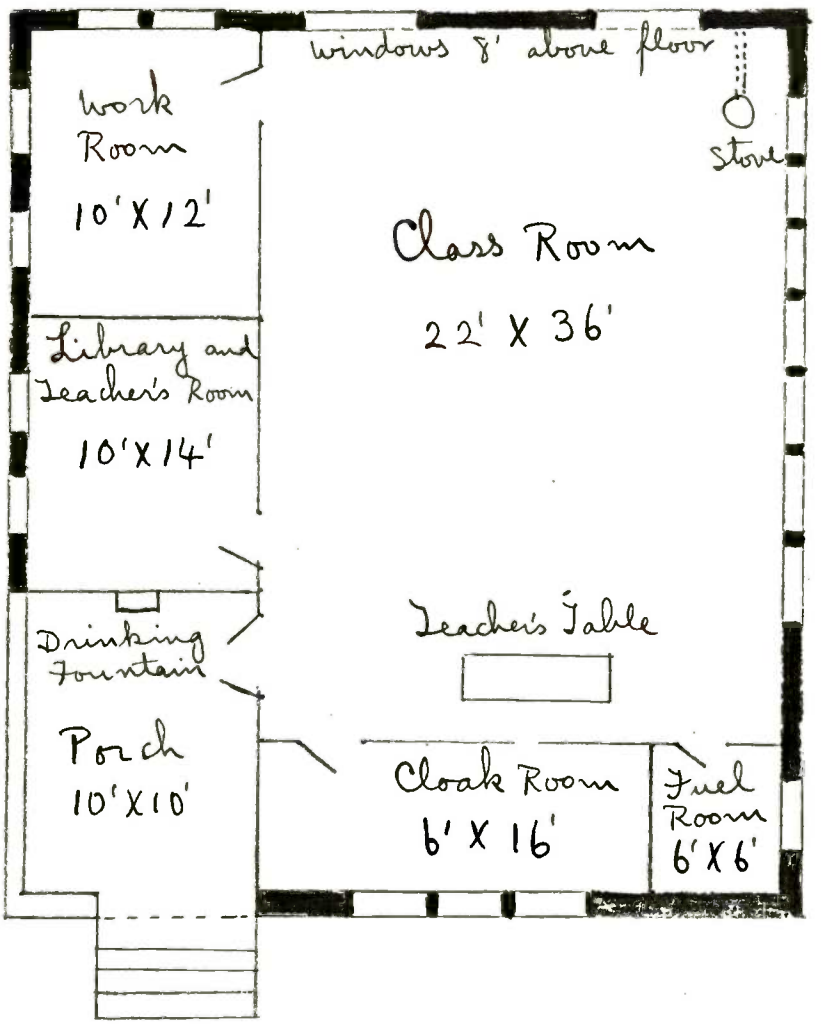
Model no. 1. Best arrangement of Grounds of a five-acre Country school.



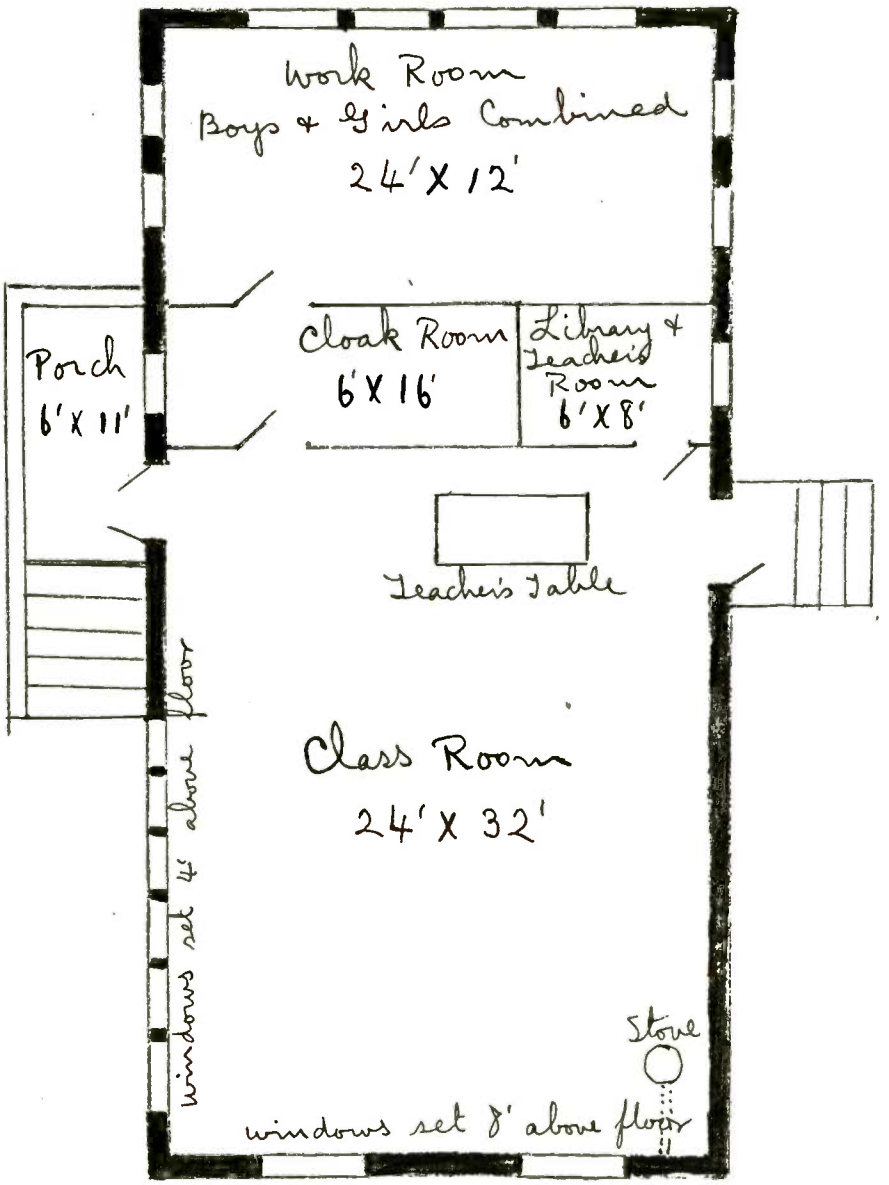
Model No. 2. A Complete Floor Plan of One-Teacher School



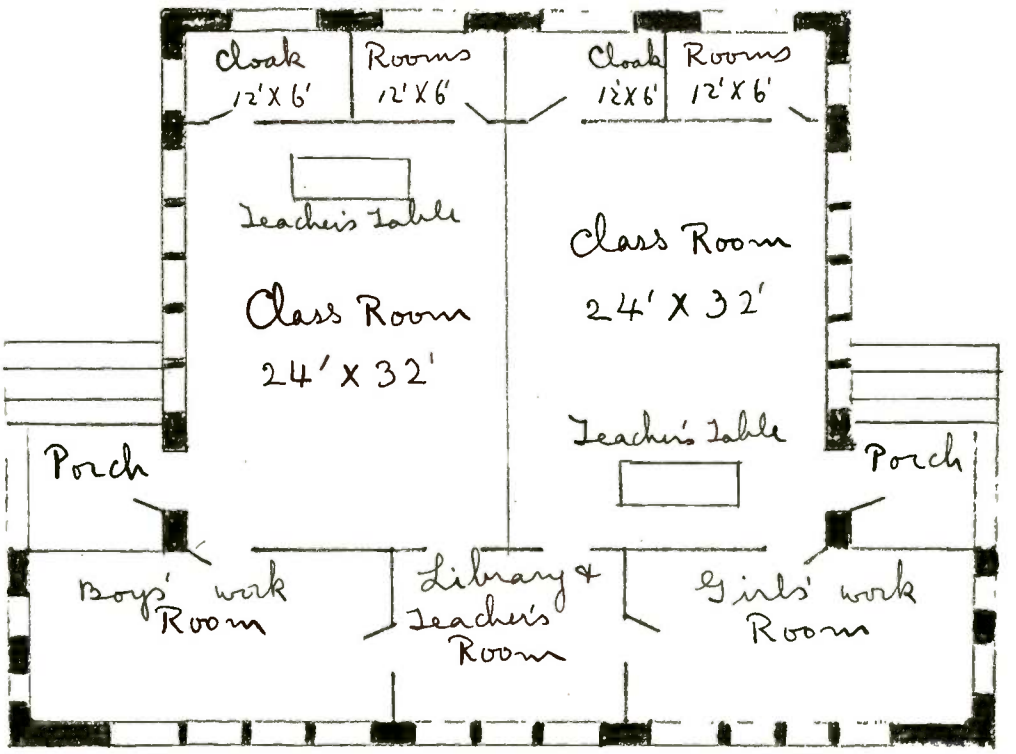
Model No. 3. Floor Plan of One-Teacher School with a Combined Work-Room.



Model No. 4. Floor Plan of One-Teacher School with Combined Work-Room for and Cloak-Room for Boys and Girls



Model No. 5. Another Arrangement of Model No. 4.



Model No. 6. Floor Plan of Two-Teacher Rural School

DIA GRAMS OF THE RESULTS OBTAINED FROM CHAPTER II

Fig. 1. Percentages of school grounds of various sizes

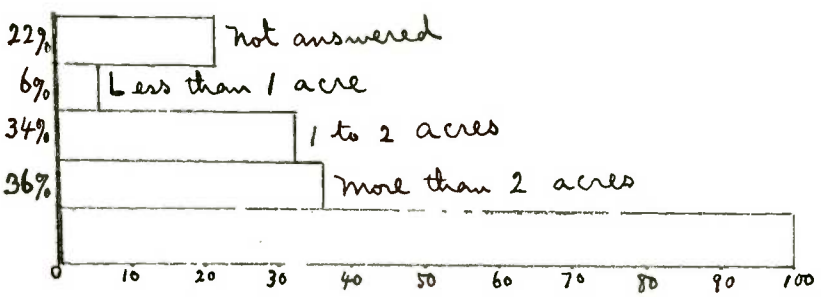


Fig. 2. Materials Used in School-House Construction

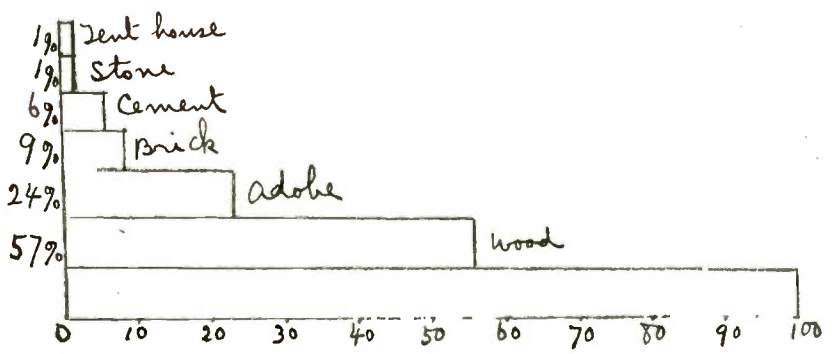


Fig. 3. Percentages of the 66 Schools that have these Rooms other than the Class Room.

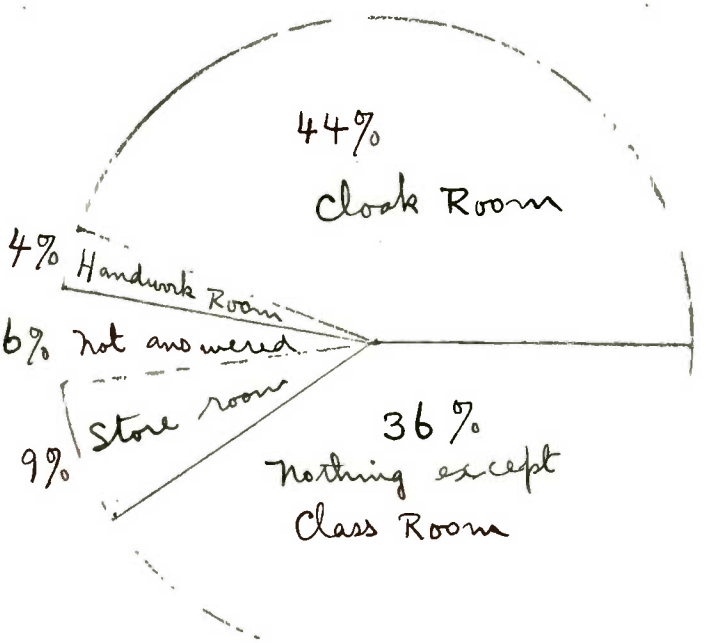


Fig. 4. Methods of Lighting in these Schools

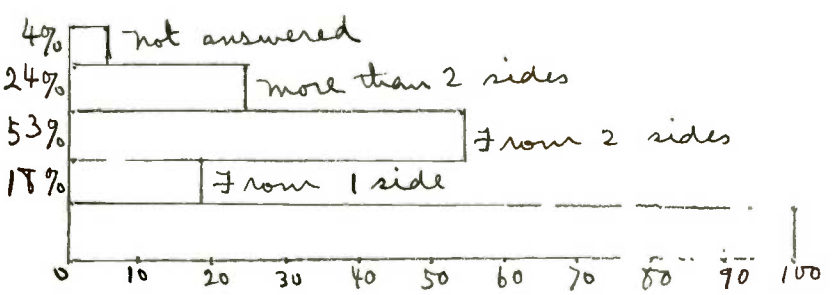


Fig. 5. Ratio of Glass Area to Floor Area

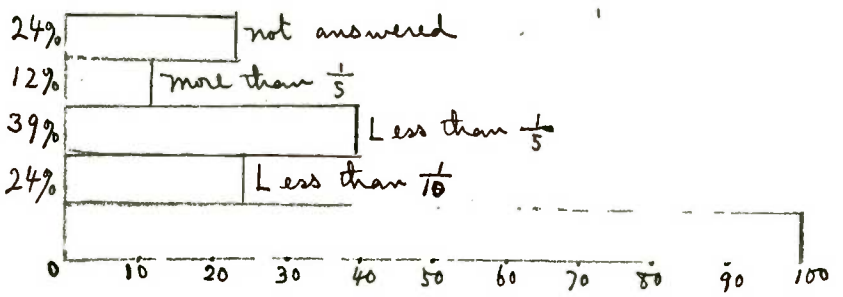


Fig. 6. Toilet Facilities

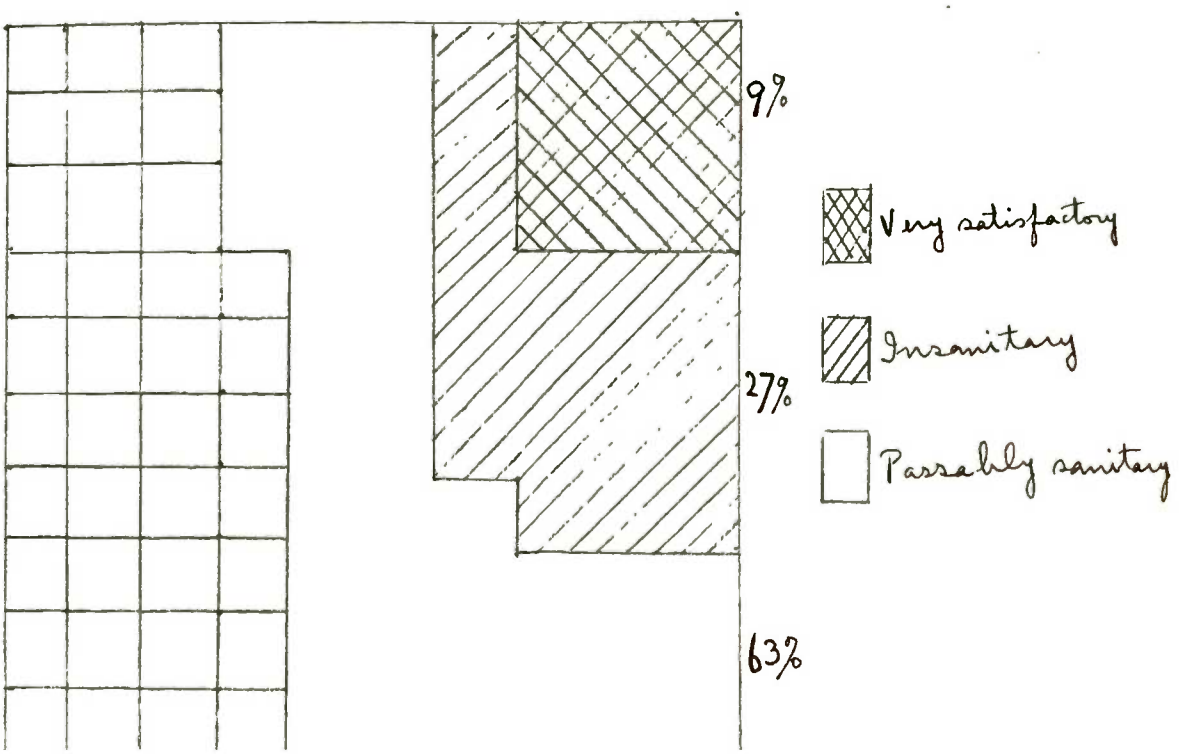


Fig. 7. Character of the Blackboard

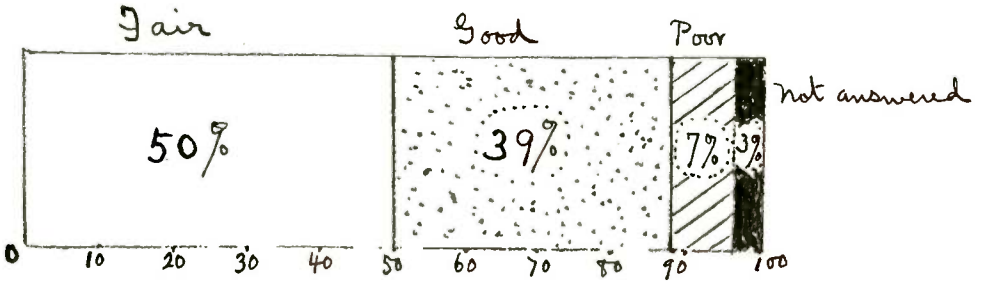


Fig. 8. Comfort of the Desks and Seats

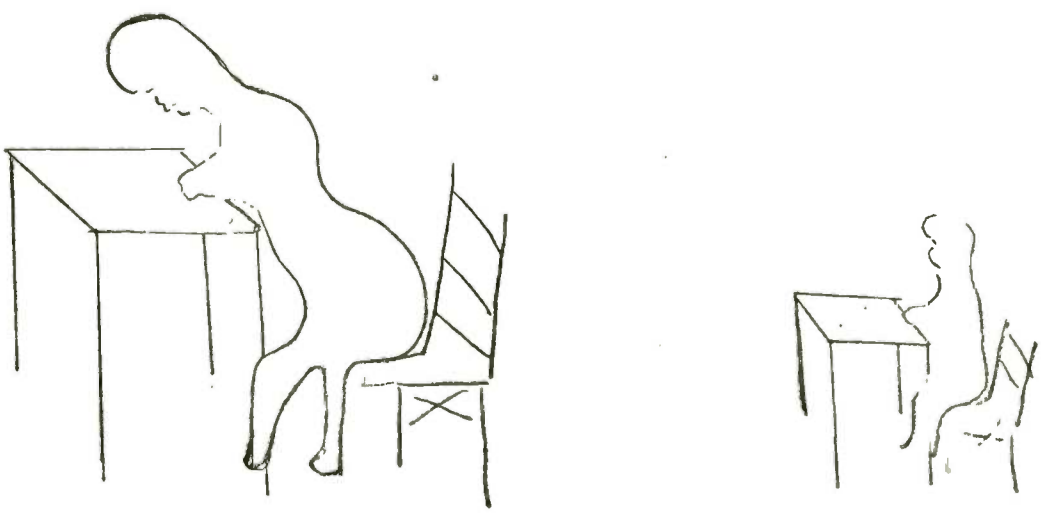


Fig. 9. Supply of School Library

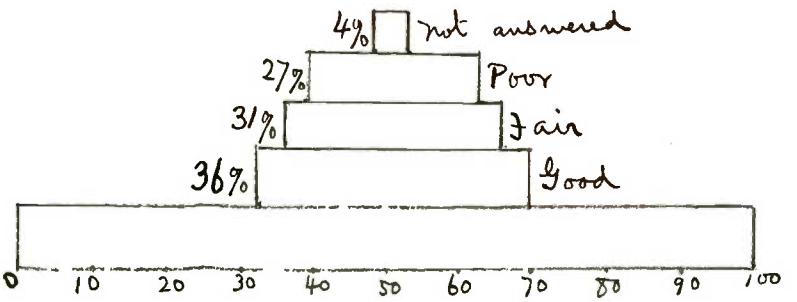


Fig. 10. Provision for the Teacherage

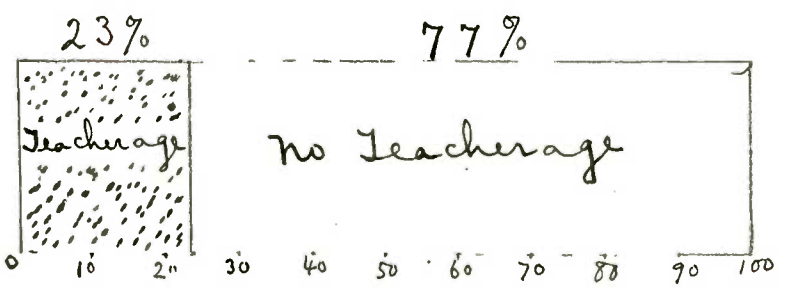


Fig. 11. How does Arizona Compare with the other 18 States studies?

1	Size of School Grounds	S	
2	School Building		I
3	Lighting	S	
4	Water Supply		I
5	Toilet Facilities	S	
6	Rooms other than class room		I
7	Desks & Seats		I
8	Teacherage	S	
9	Agriculture Plot		I

S = Superior
I = Inferior

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