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COURSE OF STUDY

FOR

THE INDIAN SCHOOLS

OF THE

UNITED STATES.

INDUSTRIAL AND LITERARY.

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Department of the Interior,
Bureau of Education,
Washington, D. C., June 19, 1901.

Madam: I return to you the manuscript which you kindly submitted for my reading.

I congratulate you on the work you are doing to make the Indian schools more useful. It seems to me that your connecting of the study of natural science with the study of soils and plants and other things relating to the farm is a very happy thought and that your manuscript will accomplish the good that you hope for.

Very respectfully,

W. T. Harris,
Commissioner.

Miss Estelle Reel,
Superintendent Indian Schools, Office Indian Affairs,
Washington, D. C.
COURSE OF STUDY FOR INDIAN SCHOOLS.

Office of Superintendent of Indian Schools,
Washington, August 10, 1901.

To Agents, Superintendents, and Teachers of Government Schools:

An outline course of study for the Indian schools is herewith submitted to you, and I trust it will receive your cordial and active support.

This course is designed to give teachers a definite idea of the work that should be done in the schools to advance the pupils as speedily as possible to usefulness and citizenship.

The aim of the course is to give the Indian child a knowledge of the English language, and to equip him with the ability to become self-supporting as speedily as possible.

Methods of instruction and subjects of study have their limitations in value, and in view of the aims and purposes in educating the Indian, who is just starting on the road to civilization, such methods must be employed as will develop the various powers and capacities with which the child is endowed, and by systematic industrial training to give him the skill in various directions designed to be serviceable in meeting the demands of active life, making him a willing worker as well as an inquiring learner.

The value of education must be measured by its contribution to life interests, and it is our purpose to fit the Indian pupil for life. It is the privilege of the elementary school to awaken the child's capacities and quicken his interests, giving him an appreciation of his own powers, awakening his interest in and appreciation of things about him, cultivating a desire to cooperate with his fellow-men in the pursuit of knowledge and its achievement.

In this course practical lessons in every branch are outlined. The child learns to speak the English language through doing the work that must be accomplished in any well-regulated home, and at the same time is being trained in habits of industry, cleanliness, and system. He learns to read by telling of his daily interests and work with the chalk on the blackboard. In dealing with barrels of fruit, bushels of wheat, yards of gingham, and quarts of milk; in keeping count of his poultry and in measuring his garden, he becomes familiar
with numbers in such a practical way that he knows how to use them in daily life, as well as on the blackboard in the schoolroom.

It should be the constant aim of the teacher to follow this course, and do as much more in each grade as he or she has time to accomplish; but the chief end in view should be the attainment of practical knowledge by the pupil, and no teacher should feel restrained from asserting his or her individuality in bringing the pupil’s mind to a realization of the right way of living and in emphasizing the dignity and nobility of labor.

As far as possible teach the children that the cultivation of good habits, self-control, application, and responsiveness are recognized as being on a higher educational plane than a knowledge of definitions and unimportant dates; that the development of character is the only imperishable object for which we can work; that consequences follow action with unfailing certainty; and that “it is the purpose that inspires us and the motive that holds us to our task that limits the extent and value of our service.”

Hoping that better morals, a more patriotic and Christian citizenship, and ability for self-support will result from what this course of study may inspire, I am,

Very sincerely,

Estelle Reel,
Superintendent of Indian Schools.

Approved

W. A. Jones
Commissioner.
AGRICULTURE.

Nature study and agriculture are very closely related and must be studied in conjunction. Agriculture is, in fact, practical nature study. In the case of our Indian schools it is the practical application on a broad scale of the principles and facts learned in the lower grades about plant life.

Agriculture is a science as well as an art, and the successful teacher of farming must have a general and practical knowledge of the principal sciences relating to his subject. For instance, he should know something about botany, whether he finds it out from observation or from books, that he may understand the character of the various plants and adapt the mode of cultivation to the nature of the crop. He must have some acquaintance with geology, which treats of the formation and structure of the earth, its soils and rocks, to enable him to understand the nature of soils and to judge of their value by mere inspection. He should also, if possible, have a working knowledge of chemistry, so that he may understand the constitution of soils and plants and fertilizers and be enabled to adapt them to each other, and to ascertain what should be added to a soil to make it produce a good crop.

The Indian pupil needs careful agricultural training, and the classroom teacher by her daily help will lay the foundation for intelligent work with the farmer and industrial teacher. To this end the classroom teacher must be in touch with the work of the farmer, in order to emphasize the important points that should be brought out in order to obtain the best results in the respective locality.

With the advice and direction of the farmer, the greatest strength of the school force should be brought to bear upon raising crops best suited to the soil, climate, and general conditions.

Where practicable, wheat, corn, potatoes, and garden vegetables should be raised, hay harvested, cows and calves properly cared for, horses groomed, milk, butter, cream, and cheese looked after, and fowl raised. Some swine should be raised at every school, and, where the conditions are favorable, a flock of sheep should be added to the industries of the school.

The general work includes keeping the barns, stables, pens, corrals, and general surroundings neat and clean. Grooming, feeding, and other care of stock and their protection from weather during the cold
season must be carefully looked after. Attention must also be given to the increase, and a helpful spirit inculcated, showing that the school home belongs to the pupils, and a pardonable pride should be felt in keeping things up to the highest notch of excellence. The fences need to be looked after, repairing and building being among the most important lessons taught. Ditches must be dug and kept in order.

Care of fruit trees, pruning, etc.

Care and repair of farm implements, harness, and vehicles.

In regions where the rainfall is light throughout the year special attention must be given to dry-weather farming, which subject is treated of in the fifth year of this course, and instruction must also be given as to the best crops to put in and best methods to employ in such localities.

The relation of soil moisture to plant growth. The effect of soil cultivation, deep and shallow. The right quantity of seed to plant to the acre. The best way to fertilize the ground. Harvesting and marketing of the crop.

In this age of competition impress that careful, rather than extensive, farming pays.

Every boy should be taught to raise crops of wheat, corn, cotton, sorghum, or whatever grows best in the climate where he is located.

The herding of cattle where this is an industry.

The care and management of swine, poultry, sheep (where the conditions are favorable), cattle, and horses. The principles of stock feeding and breeding, diseases, etc.

The management of a garden, raising such vegetables and small fruits as the soil, climate, and general conditions will justify.

The propagation of plants, seeds, cuttings, grafting, etc.

Growing vegetables under glass. The care of hotbeds, transplanting, fertilizing.

The general care of an orchard; propagation, planting, pruning, spraying, etc.

The nature, causes, and prevention of plant diseases.

Injurious insects; their nature, methods of destroying plants; insect remedies.

The proper use of tools and their care after using.

Management, care, and breeding of dairy stock.

Both boys and girls should be taught dairy bacteriology, the composition and care of milk and cream, ripening the cream, butter made from cream that is unripened.

Churning, working, and packing butter; cheese making; the care of dairy apparatus—the separator (if one is used), churn, butter workers, cream pots, milk pans, pails, and crocks.

Landscape gardening and horticulture. The aesthetic side must not
be neglected. The grounds surrounding the school buildings should, where practicable, be laid out after some plan. In all instances the lawn should be kept green by plowing and sowing good lawn-grass seed or by sodding, if considered better and if conditions permit. By bestowing a little care in keeping the grass cut, and well-kept walks across the lawn to the different buildings, the lawn may be made very attractive. The farmer and industrial teacher will be able to give much valuable instruction to the pupils in this work by having them assist in everything done and talking over plans with them before actually doing the work, this being a most important part of the training, since it will train them in designing and planning ahead for work.

In the favorable locations flowers must be raised (from seeds, slips, roots, etc.), not only to add to the attractive appearance of the institution, but for instruction for the pupils and to foster a spirit of interest and pride in the appearance of the school home. The educative value of horticulture needs to be emphasized. A knowledge of flower-ering plants and ability to raise them successfully leads to lucrative positions for men as well as for women. Where possible, a conservatory, however small, should be maintained and house plants raised. Many of these may be transplanted in the flower beds the following spring, in this way teaching the care of flowers at every season.

Arbor Day.—This day should be carefully observed in all schools, and with a little attention given to the subject many shade trees may beautify the grounds and amply repay the pupils in increased comfort, while at the same time giving instruction by means of the valuable object lesson presented.

Arbor Day will afford an appropriate opportunity for impressing upon the pupils the value of shade trees to the farmer and the importance of forests to his welfare. Call the attention of the pupils to the beautiful shade trees that surround the school (or, if there are none there, take them, if possible, to some place where trees have been put out) and explain that this is the result of planting in previous years.

Once a week the farmer will be expected to give instructions in farming to the whole school at the evening session. By planning a systematic course of talks on the farm, which will include care of barns, stables, pens, corrals, silos, and in fact everything needed to be known in the management of a farm, this will become a most interesting evening session, and much benefit will result.

Irrigation.—In many parts of the country farming can be carried on only by means of irrigation, and it is expected that farmers in such localities will have a large acreage under cultivation, that the pupils may have much experience in the management of irrigating ditches and in the general plan of irrigating.

As it is one of the main objectives of our work to get the Indians to cultivate more land, and as the old Indians, from custom and want of
knowledge and experience, cultivate so little, it is desired that the students obtain such a knowledge of and experience in irrigating methods that they will not only have a desire and ambition to irrigate more land and largely increase their acreage under cultivation, but that they will have the ability to carry out their desires and earn a good living out of their lands, without finding it the hardship that their parents now consider it.

The farmer must impress the pupils with the value of irrigation by giving them talks on the subject, illustrating by the actual working of the school irrigation plant. As far as is possible the boys must be put in charge of the irrigating, that they may learn by experience the amount of water required, the proper times to irrigate, and the importance of keeping the ditches open for the free passage of the water and the reservoirs and gates in good repair. Where pumps are in use for the purpose of providing water for irrigating purposes drill a detail of boys in the running of the pumps, they may learn to do this work without help, changing the detail occasionally, that all may have the benefit of the experience.

In planning the work for the boys the first questions the farmer must consider are the following: What will be the nature and character of the soil of the boy’s own land? What will he be able to grow on his own land? If the conditions are favorable for fruit culture, the greatest stress should be laid upon his training in raising fruits of the kind suited to his climate, that he may be able to successfully carry on the industry at his own home.

If his home is in a region where nothing can be raised without irrigation, the boy must be carefully trained in the manner of operating and, where possible, in constructing irrigation ditches. If in arid regions, where moisture can be conserved in the soil by careful preparation of the ground, he should have practical training in observing, while very young, and later in himself preparing the ground in such a manner and in growing the crops best suited to the general conditions. If garden vegetables can be successfully grown and marketed, let the farmer’s energies be directed to training the boy in raising such crops. Should hops or other specialties yield the best income in certain localities, let this crop engage the attention of the boys whose land is especially fitted for this. Fitting the boy to make his living out of his land must ever be kept in view in training the boy on the school farm. Therefore, after finding out the crops that will grow in their respective localities, the farmer should outline a series of rotations of crops, as tried and found practical at the nearest agricultural experiment station, putting this in practice on the school farm, thus giving the boy daily practice in raising what he is going to raise for himself when he goes to his home, and convincing him of the wisdom of keeping in correspondence with the agricultural experiment station for
suggestions and for the bulletins issued from time to time, which contain much helpful information.

If stock raising can be more successfully conducted than farming, the training that the boy receives should be along this line. Special instruction in the herding of stock, branding, pasturage, and general management must be given, beginning with the first year when the boy is too small to actually do any of the work, but can observe and become familiar with operations. The boy must assist each year, doing a little more each year as he grows older, until, finally, he will be able to take the work in hand himself and successfully carry it on.

All theoretical and experimental work must be discarded by the farmer. The boy has but a few years to go to school, and it is highly necessary that he be taught the practical work necessary to become self-supporting while in school; therefore, raise what the soil will produce best, showing the boy the best ways of doing the same, how to improve the land, the crop, and consequently the price said crop will bring. Do not attempt anything but what can be successfully raised in the locality. The soil, climate, and conditions at the schools on the different reservations are similar with those existing at the homes of the pupils of the tribe attending that school; therefore, it will not be a difficult matter for the thoughtful farmer to intelligently plan a rotation of crops and show the boys its advantages, that they may carry out the same plan themselves when they leave school.

During the winter months—in fact, at all times, but during this period especially—have the boys do all the work about the barns and stables with the help of the farmer. Have them rise early and repair to the stables before breakfast. They must feed the horses, then clean the stables, brush and curry the animals, fill their racks with hay or fodder, and water them before returning to breakfast. Another detail of the boys will do the same with the cattle, others will do the milking, and still others will attend to the needs of the sheep, hogs, and other stock. Fix a certain time for the boys to report at the barn and stables and see that it is observed punctually. At noon the animals must again be fed and watered in the same systematic manner as in the morning. In the evening the same chores will be performed by the boys—feeding, watering, and preparing for the night. Lanterns may have to be used, and if so, they must be in turn taken charge of by certain boys, who must be held responsible for keeping them always well filled with oil, well cleaned, and with globes always free from dirt and smoke. Show the boys how to use lanterns in a safe manner, and caution them as to the danger of fire from the lanterns. A quantity of dry bedding must be provided for all the animals, but not too much. If any horses have been out, all mud must be removed with a brush, and if clay and ice have frozen to their legs the farmer will show the boys how to remove it by wrapping cloths about the limbs or some
other effectual means of thawing it. In cold weather the horses should be blanketed. Detail several boys to make the rounds of the stables each night before retiring to see that all is well.

There will be enough of this work to employ every boy, and its value can not be too strongly emphasized. It will accustom the boys to early rising, and to working in a thorough and systematic manner. Insist upon strict punctuality, and allow no work to be done in any but the best manner. The floors of the barn and stables must at all times be swept clean, and feed and hay stored in their proper places.

These farm chores being principally performed in the morning and evening, and as other farm work is necessarily suspended during the winter months, during this period the boys must do much work in the blacksmith and carpenter shops, dairy, etc., and every effort must be made to acquire proficiency in these departments during the prolonged lull in farming operations. During the planting and harvesting seasons, the reverse will be the case. The farm work will assume primary importance, and the majority of the boys must then be detailed to assist the farmer.

So during the fall and spring of this year the greater number of the boys will be engaged in farming, and during the winter the most attention will be given to the shops, the dairy, and similar subjects. In this way each boy will obtain instruction and practice in every branch necessary to make him a good farmer and to enable him to become equally proficient in all. Time will also be economized and profitable occupation provided for every boy throughout the year.

A few trials will enable the farmer to judge as to the proper number of boys to place in a particular detail and as to the frequency of shifts. One boy must not be left too long on one kind of work, as a good farmer must have a general knowledge of many subjects.

Students should read and study one or more of the many standard books on agriculture written by men who have given the science careful study, and who, by years of thought, research, and experiment, have made possible many improvements over the agriculture of our forefathers. Results at the experiment stations in every State and Territory of the United States show what can be done with plants, by carefully studying the conditions, and by putting thought and time into the work.

Since our Indian pupils all have land, and we do not want them to dispose of it, thereby becoming homeless wanderers, it is our object in educating them to give them the benefit of the experiments and opinions of the leading agriculturists of the day, and by training them in the most modern methods of tilling the soil and raising crops, to make farming "pay," and to stimulate a desire to farm in the most approved manner, and, each year, to improve over the work of the year previous.
COURSE OF STUDY FOR INDIAN SCHOOLS.

The farmer will find the Bailey series, Voorhees's First Principles of Agriculture, and many other agricultural works to be valuable aids in directing the work of the children, and in training them intelligently in agriculture.

The agricultural bulletins issued from time to time by the Agricultural Department may be secured by application to that Department, and will be of the greatest value to the farmer.

It shall be the duty of the farmer at schools to raise the grasses that are needed in making the basketry to be taught. The grasses must be carefully harvested, and safely housed, that there may be an abundant supply of material for the use of the school. The sedge forms a good textile filament in some localities, and there will be ample room on the school farm to raise much of this and other valuable grasses. The plants from which dyes are procured for coloring baskets, wool, etc., must also be raised for use in making the native wares. In their respective localities the Indian teachers of basketry will know the best grasses, plants, etc., for the work, and the farmer will cooperate with the native teacher, securing through her advice the necessary plants, and seeing to it that plenty of material is raised for the furtherance of this project.

FIRST YEAR.

The farmer must commence with the child the first year in school, but nothing very extensive can be attempted at this time. Attention should be given to creating in the child an interest in the domestic animals and fowls. Have him help as much as he can in the light "chores," and impress upon him the value and importance of his assistance. Tell him of the habits of the fowls and anything about them that will arouse his interest, and let him scatter the corn and place the food for them to eat. Also give the children the duty of daily giving water to the poultry and such other little duties as may be available. Have the little boys accompany the older ones when they go after the cows to give them the benefit of experience. Do not restrain the natural curiosity of the child and his tendency to ask questions, but rather gratify and encourage it.

In regard to agricultural matters, the little garden which the child plants and the things he learns in the class room will stimulate an interest in farm operations, which is very desirable and should be encouraged.

Out of school hours let the little ones, especially the boys, be present wherever farm operations are going on. The curiosity of youth will be all that will ordinarily be necessary to secure their presence. Let them follow the plow and the harrow and do their little toward assisting with the planting of corn and other seed. When the time for hoeing comes, give them little hoes and have them assist where they can, telling them how important is their help. This same idea
can be carried out in harvesting, in which children invariably delight to participate.

The teacher of farming will be able to find many light occupations in which the child may profitably be employed and his interest aroused and cultivated. But care must be taken these first years to see that the child does not regard his work as a disagreeable task. Make him feel that it is an honor and that he plays an important part in the affairs of the farm, the poultry yard, etc. Always manifest an interest in his work, and whenever opportunity offers, ask him questions and encourage him to talk about it. Foster a spirit of good-natured competition and rivalry among the boys, and the rest will be comparatively easy.

At every school where such labor is performed the small boys should be given the work of keeping the wood boxes and coal bins in every room and department always well filled. Even the smallest boy can carry one small stick, and thus early acquire habits of helping.

SECOND YEAR.

This year the ideas outlined in the first year must be continued. The children can now be given some of the "chores" to perform, such as shelling corn for the fowl, assisting in driving the cows, and keeping the premises clean under the direction of the larger boys. Another important duty which, as in the first year, the small boys will be expected to perform, and which they will doubtless find much enjoyment in carrying out, is keeping the wood boxes and coal bins full at all times.

They can now, also, assist more materially in the lighter work of planting, such as dropping corn, potatoes, etc. As in the preceding year, have them assist to a limited extent with their small hoes and rakes in the work of cultivation, showing them the proper manner of doing it, and explaining in a simple way the advantage of stirring up the earth around the roots of the growing plants, and why the potatoes are "hilled," while the corn is not. This, in addition to such other means as will occur to the teacher of farming as profitable and calculated to increase the child's interest in and attachment for the work, and in connection with the work in the child's garden, will be sufficient for this year. The work performed by the pupils must still be of a very light character.

THIRD YEAR.

The boys are now large enough to attend to the more important duties and "chores" incident to every farm and dairy. Have them drive the cattle whenever necessary, occasionally taking with them the smaller boys, as directed in the outline for the first year. When the stables are in use, have the boys keep them in order and feed and
water the cattle and horses. If practicable, give the boys practice in driving the horses, both single and in teams, and in riding those that are gentle. The farmer will be able to use the boys in many secondary ways in the cultivation of the crops, such as driving the horses in harrowing and cultivating, hoeing the corn, potatoes, and similar crops, assisting in making hay, harvesting, and in husking corn. This will all be of the greatest practical value to the pupils and will prepare them for the more serious work of the following years. The instructor should use every opportunity to illustrate and apply the principles and facts learned in the class room. The child’s garden will still be a very important part of the work.

The farmer will frequently consult and advise with the teacher in the class room, in order that the work done there may be of such a practical character that when the pupil reaches the point where he begins to do serious work on the school farm he will be found prepared for the work before him.

When the farmer takes the boy in hand this year to train him to become a successful agriculturist, he must bear in mind the fact that the boy will, in all probability, go from the school to his allotment of land. Perhaps he will find neither a fence nor a building of any description on the place. The outlook will be discouraging enough to the stoutest heart, and the boy full of energy and ambition will consider it an almost hopeless task, unless he has been prepared to meet the exigencies of the situation.

Early in school life train the boy to think, to be ready, and by talks induce him to plan for the future. Talk to him a great deal each year about how he will occupy his time when he leaves school. Find out his ambitions and endeavor to inspire in him a desire for an education that will fit him to make a success of whatever he undertakes. Prepare him for what he is to meet by mapping out a course of procedure. Familiarize him with the conditions with which he will have to contend in his future home, and educate him to meet them.

When you go to the field with him, show him the lay of the land; consider how to advise him to select a site for his garden and a field for his first crop. Show him that when he begins farming it will be better for him to plow first, prepare his ground, and put in his crops, and while waiting for these to come up he can do some fencing. Carefully consider the soil and climate in advising him relative to crops, also as to the vegetables he must plant in his garden. If irrigation is a necessity, instruct him carefully in the building and operating of irrigating ditches, the best ways of carrying on this work in the locality in which he lives, and the best means of bringing water to said ditch. In order to do this the boy must have careful instruction in this work, which the farmer is expected to give him each year from now on until he is able to do the work alone.

At his home the boy must have a barn first, later a house. He can
sleep in the barn at first until he can build a house. At school, during many months in the year, he must assist in putting the needed repairs on school buildings, outhouses, etc., and receive enough instruction from the carpenter to enable him to construct this small barn, which of necessity he must have later on in order that his stock may have shelter and his implements be protected. "Build the barn and the barn will build the house" is a true saying. The question of good water must be considered. If there is running water on the place, or near, the barn should be built not far distant, care being exercised in not letting the stable drain into this water. The farmer must remember that the boy will not have the school carpenter to call upon in case his roof should leak or his fences need repairs, and he must be trained to do this work himself and to do it well. Nor will he have a blacksmith to whom to take his horse should it cast a shoe. The tire of his wagon wheel may need repairing, or the spokes require fixing. The boy's training in farming must embrace enough work at the forge to do all this work easily. His farming implements will need repairing, and he must be taught to know how to mend them.

Farmers must talk to the boys constantly about the importance of their knowing how to do these things for themselves. When a wheel breaks, go directly to the shop with the boys and show them what needs to be done, mending the broken wheel at once, and having them help to do the work. Show them how easily they may have a shop of their own, and how useful one is in saving time that would have to be consumed in making long trips to a blacksmith; also in the expense of paying someone to do what a boy can so easily do himself.

Impress in every lesson that a penny saved is a penny made.

FIFTH YEAR.

Up to this time work in instruction in agriculture has been of an informal and preliminary character, but now it is considered that the pupil is of sufficiently mature age to begin work systematically and in earnest. As far as possible, make the work done illustrative of the knowledge gained in the class room under the head of nature study. Keep in mind these two rules to govern your work: 1. Make the instruction and work as pleasant and fascinating to the boys as possible. 2. Be practical; i.e., teach only those things that will be of advantage to the boy when he is farming for himself.

Each boy will still be conducting his garden or "farm" as outlined in the course on nature study, but at the beginning of this year the supervision and control of the work will pass from the nature-study teacher to the farmer. It is needless to say that this work is of very great value to the pupil. When he has finally finished school and has a farm of his own his natural impulse will be to be the real owner of a garden similar to the one he leaves behind him in school, and from
his long experience with the work at the school—his experiments, failures, and successes—he will commence his work with a skill and confidence that will insure his success. The farmer or industrial teacher will render all necessary assistance to the pupils in their gardening, showing them the best methods of planting and cultivation and manner of conducting.

In the farm work, whenever practicable, assign to a detail of boys the work of doing some separate piece of work, as, for instance, the planting of a section of a cornfield, and such similar work as may arise as the season progresses. Exercise a little supervision over the work, and when done criticise it before them, commending what is well done, telling them what makes it satisfactory, and showing them in what respects it might be improved.

Let the boys exercise as prominent a part in the farm work as possible, giving them exclusive control whenever it can safely be done, even as early as this year. If you can make them feel that they are an important factor in the conduct of the farm, little urging will be necessary to bring out their best efforts. In this way their active interest will be aroused, which, it is needless to say, is invaluable.

Dairy work will be given much attention from this on. Give the pupils actual practice in the everyday duties incident to the dairy. Teach them how to milk the cows, care for the milk, skimming, "molding" the butter, making cheese, etc. See that all pans, churns, and other utensils are kept clean and sweet and put away in proper order. It is inadvisable to use complicated and expensive machinery in the work of the dairy. Many pupils can not have these when they have a dairy at their homes, and we must train them in the use of such as they will have. Therefore an ordinary skimming spoon is preferable to a "separator," and the other utensils should be correspondingly simple in character.

Have the pupils assist in looking after all the farm animals, especially during the cold months. A number of swine should be kept and looked after exclusively by the boys, and, where conditions permit, sheep should be raised.

The farmer and industrial teacher must keep in close touch with the work going on under the head of "nature study" in the class rooms and endeavor to cooperate with the class-room teacher. Nature study and agriculture both have a common object, and the farmer and class-room teacher must work together to this end. The work on the farm should be a practical demonstration of the principles and facts learned in the class room. In this connection the farmer will familiarize himself with the course laid out for the class in nature study. The volumes in the school library recommended to the class-room teacher will enable the farmer to keep in touch with her work and advise her as to presenting the subjects that come up from day to day.
The example set by the Dutch in the Netherlands of diking, draining, by the use of sand and clay turning their marsh earth into flower gardens, by building up and improving their land, shifting from one place to another such soil as each section needs most, affords a practical lesson for the consideration of persons whose farm lands are not all that they would have them. The competition and friction in the trades make it wisdom to think twice before leaving the farm for the city, for does not the plow open the royal road to prosperity?

**Model Farm.**

In many schools it will be possible to have a model farm of 2, 3, or 4 acres, dividing the proceeds among the boys having it in charge under the management of the farmer. To make this a practical illustration of what can be done at the homes, this farm should produce crops sufficient to furnish a moderate-sized family with vegetables throughout the year; furnish the coarse fodder for one horse, one cow, one or two pigs, and some poultry, and have something left to sell; the farmer to select the crops adapted to the needs and tastes, market facilities, soil, and climate of his environment. The land should be occupied with crops not only during the summer, but also during the winter months, thus preventing, more or less, the loss of plant food by the wash of winter rains. Each field must grow at least two crops, and sometimes more, every year. Each field should grow a manorial crop (cowpeas, etc.) regularly every other year, which crop not only tends to increase the supply of plant food in the soil, but also to keep up the supply of organic or decaying vegetable matter in the soil, which is so necessary and helpful in maintaining the proper soil texture.

A part of these manorial crops is plowed under, the rest is harvested as forage for the stock, the manure from the stock being returned to the soil. These crops thus serve a double duty; they produce animal products and at the same time improve the soil.

It may be suggested here that strong animals are necessary for thorough farming; without these deep plowing is almost an impossibility. Many farmers value a horse having great speed more than one having great strength, and, as a consequence, are able to do barely more than scratch the surface of the soil with the plow.

The value of a manorial crop turned under with the plow must be emphasized and illustrated on the school farm each year of the pupils' training in farming.

The following is a table showing the rotation of crops as practiced on the model farm at Hampton Institute, Virginia, where this plan has been tried with great success. It is not expected that this table will be adapted to all localities, but the farmer can substitute suitable crops for those which are not suited to his district, and keep in touch with the practical work done at the nearest agricultural experiment station,
as frequently much valuable advice as to rotations of crops and plant
diseases and their care and prevention may be obtained through such
correspondence.

*Rotation of crops on model farm of 4 acres.*

<table>
<thead>
<tr>
<th>Field 1</th>
<th>Field 2</th>
<th>Field 3</th>
<th>Field 4</th>
<th>Field 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn. (Cowpea.) (Clover.) (Vegetables.)</td>
<td>Sweet potatoes. (Wheat.)</td>
<td>Summer vegetables. (Clover.)</td>
<td>Sweet corn. (Grass.)</td>
<td>Fodder corn. (Cowpea.) (Oats.)</td>
</tr>
<tr>
<td>Summer vegetables and sweet corn. (Clover.)</td>
<td>Sweet corn. (Cowpea.) (Grass.)</td>
<td>Corn. (Cowpea.) (Clover.) (Vegetables.)</td>
<td>Sweet potatoes. (Oats.)</td>
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</tr>
</tbody>
</table>

The parentheses ( ) indicate either catch crops sown between the rows of other crops or fall-sown crops to be harvested as the main spring crops the following season.

It has been tried and found practical in some schools to give the boys who are old enough a piece of ground, on which they will put in practice the lessons learned in the class room and receive further instruction in practical agriculture from the farmer, and on which they may raise a crop to market and thus add to their bank account begun the first year in school.

In schools where the conditions are unfavorable to maintaining a model farm this may easily be carried out, and the ownership idea will tend to increase the pupil's interest in the work. This must not interfere with the regular work on the school farm and garden, which every boy must share the work of, but can be done at times when the farmer shall arrange for said work. The farmer may, in his discretion, allow each boy to grow a variety of vegetables on his own particular plot of ground, or, if deemed wiser, he may divide the various crops among the pupils, giving one boy potatoes to raise, another cabbage, etc., not forgetting that the crop raised by each boy must be
changed each year. The school table will depend upon the general garden for supplies, and the farmer will exact a share of the work in the garden from each boy. When the pupil is not needed by the farmer, the time may be put in on his garden. This will increase his bank account, as well as giving instruction. With a little thought the farmer can so arrange the work as to make this plan interesting and lucrative, and he can so plan the boy’s time that both gardens will receive attention. The farmer will advise, direct, and instruct the boys daily in the work on their respective plots of ground.

By this method the pupils will have a most excellent opportunity to obtain the very best results in growing the crop he undertakes. In these lessons in practical farming the farmer will show the pupils very plainly the principles involved in the rotation of crops and how the continued removal of any one kind of crop is sure to produce exhaustion. For example, if the crop is potatoes, the available supply of potash will soon be exhausted if the same crop is continuously raised, and the surplus phosphoric acid for which the potatoes have no use might be washed out of the soil and wasted; while, if some crop requiring more phosphoric acid should be planted, a good crop might be obtained and at the same time the decomposition going on in the soil would render a new supply of potash available. For this reason the crop grown by each boy must be changed every year. The fact must also be emphasized that after crops have been harvested the formation of plant food in the soil is continued, and is liable to be lost if there are no growing crops present to make use of it. When the class-room teacher has impressed firmly upon the minds of the pupils the composition and origin of soils, explain how plants are composed of many different elements and how absolutely essential those are to plant growth. In this way the pupil will be led to see how impossible it is for any particular plant to prosper in soil in which the necessary elements of the plant have been exhausted or are naturally lacking.

Teach the use of refuse matter of all sorts to fertilize the soil and that soils naturally deficient in important constituents, or made so by long continued cultivation may be improved by the addition of suitable fertilizers.

Explain the action of light, heat, and other agencies in promoting the growth of plants. Show how an occasional change of seed—i. e., seed grown in soils of a different character—is beneficial. An occasional change of seed from one latitude to another is also wisdom. The greater difference in the constitution and character of two crops the more likely they are suited to follow each other.

Look into the differences in the roots of plants and explain how wheat, corn, etc., have surface roots, while cotton, tobacco, alfalfa, and others have long tap roots which extend down into the subsoil.
Impress by precept as well as by example how necessary it is for the well-being of the farm, the appearance, etc., to keep the place free from foul weeds, which should always be cut before they have transmitted their seeds.

FIFTH YEAR.

This year the boy will be able to handle the plow, and the farmer will take him into the field and carefully instruct him in the best ways of doing the work. Let one or two boys at a time carry out the entire process of a day's plowing, from the feeding of the horses early in the morning to the closing of the stables at night. Let them, in the morning, clean the horses—feed, water, and harness them—take them to the field and hitch them properly to the plow. If they are beginning a new field, show them how to commence, i. e., whether to plow it into "lands" or otherwise, and how to start. Accompany them in their plowing for a while until they become fairly well accustomed to the work, and when the day's work is finished examine the plowed field in company with the boys, criticising it in a kindly way, commending the good points, and showing how it may be improved upon. The boys will return the horses to the stables and themselves attend to their evening care. The farmer must here impress strongly the necessity of feeding and watering the animals regularly, and he will probably have to repeatedly insist upon this point, for the boys are prone to forget. He will also instruct them in the proper care of the plow, including sharpening, proper housing, and keeping it clean and bright.

The process thus briefly outlined for a day's plowing must be repeated when using the harrow and other implements. The object is to train the pupil to be able to carry out each farming operation himself in its entirety from beginning to end, just as every farmer must do, and as the boy will have to do when he has a farm of his own.

Talk and consult with the boys as to the crops to be put in for the winter, explaining the respective advantages of the various available crops and taking them into his confidence and giving them as large a share as possible in the farm management. Then when the crops are thus settled upon, there will be talks and discussions on the proper preparation of the ground for the different crops. The pupils will also assist in the general preparation of the farm for the winter.

In regard to harvesting, the boys are now large enough to take an active and important part in this work. Instruct them in the best manner of caring for the various crops as they ripen. Thus corn must be watched carefully and cut at a certain time; must be properly cured before husking and stored in well-ventilated cribs, and where cribs are to be built—if possible—make them rat-proof. The fodder will also need care. And likewise the other crops. Certain special
rules must be observed with each, and the teacher of farming will be expected to teach them to the students at the appropriate time.

It is hardly necessary to repeat here what we have already said many times, that in harvesting, as in all other farm work, the pupils must be given the largest possible share in the operations, sometimes testing their judgment and ability by letting them do it all.

We direct attention here again to what was said in the fourth year as to the strict observance of early rising and punctuality and system in the performance of the chores and other duties.

Avoid danger from fire; smoking must not be tolerated in the barn or on the school grounds. Lighted matches must never be thrown on the ground; nor, indeed, should matches be left at all in the barn, since rats and mice often ignite them. Care must also be observed in the use of lanterns.

In the carpenter shop plans should be looked at carefully and studied for buildings, pens, corrals, barns, and houses this year. Drawings for the same should be executed under the direction and instruction of the carpenter. The boys must assist in the repair work, seeing to it that fences and outbuildings are kept in good condition. Buildings must be well painted and neat in the interior as well as externally. At the proper season whitewashing should be done very extensively around the buildings and grounds. The sanitary conditions about the buildings and grounds must receive careful attention and its importance shown to these farmers in embryo. No refuse must be allowed to accumulate on any part of the school grounds; all that can not be used for feeding the stock or for manuring the ground should be burned.

**IMPROVEMENT AND CULTIVATION OF SOILS.**

Teach that soils are improved in two ways—first, by natural causes, and second, by artificial means. The improvement by natural causes amounts to considerable after long lapses of time, but, considered as an appreciable benefit to the farmer, is insignificant in comparison with the results obtained by artificial means.

One of the prominent imperfections of soils is in regard to the quantity of water they contain—either too much or too little. In the first case the remedy may be found in proper drainage; in the second, either by irrigation or by adding to the soil such materials as will increase the retentive power of the soil for water.

**Drainage.**—In all lands there is what is known as the "water level," even though it be far beneath the surface. In many places this may be ascertained by digging a hole in the ground and observing whether it fills with water. If so, the "water level" will, of course, be the point to which the water rises. If this be near the surface, the ground will be too wet for good crops, for the reason that too much water in
the soil prevents circulation of air and also keeps it too cold. The soil may also be too wet by reason of absorbing too much of the rain that falls upon it. In both cases drainage will, in nearly all instances, be a remedy; in the first case by lowering the "water level," and in the second by allowing a more rapid circulation of the water through the soil.

Methods of draining.—There are two principal methods of draining in use, viz: Surface draining and underdraining. If the school farm possesses any drains of any character, take the boys to the most available point for examining them and explain them on the spot. Show them the land that has been drained and contrast the conditions before draining and since, and if there is any other similar land on the farm or in the vicinity still undrained this will serve as a powerful object lesson to the students on the benefits of draining. Underdraining is the most desirable and beneficial where obtainable. Surface drains are usually unsightly, and, being often impassable, interfere somewhat by dividing the land into small fields; but in this country, where land is cheap and abundant, tile or clay pipes are too costly for profitable use. Especially is this so among the Indians, who are often unable to drain their wet lands by this expensive method; therefore resort must be had to open ditches, which, in spite of their inconveniences, will be found to be of immense benefit to wet lands. Wherever rock is abundant excellent drains may be had by constructing covered ditches.
with this material, making them of a diameter sufficient to preclude the possibility of clogging. If there are any wet lands on the school farm give the pupils actual experience in the construction of drains, and use the land thus reclaimed in growing crops.

Deep plowing and subsoiling are a means of draining to a limited extent, but can not be substituted for ditching in wet, swampy lands.

Emphasize the advantages to be obtained by draining. Some of the principal benefits are the following:

1. It adds to the farmer's wealth by reclaiming wet lands which are often found to be the richest part of his farm. In the very frequent cases where the wet lands intersperse with the dry tracts drainage will change these detached plots into one continuous field and thereby decrease the cost of cultivation.

2. By removing the water from the surface the roots of the plants are enabled to penetrate deeply, thereby not only adding to the health and size of the plants, but preventing the effects of drought, as the roots of the plant are so deep that the effect of the sun's rays and the dryness of the surface soil does not reach them.

3. It improves the soil by inducing a more rapid fall and dispersion of the water through it, thus carrying air and warmth to the lower levels.

4. It adds further to the warmth of the soil by preventing excessive evaporation, which is always a cooling process.

The efficiency of drains depends upon the free passage of the water through them, and for this reason they should be given a sufficient fall to insure a steady flow. One foot in 500 is ample for drain pipes. In open ditches and covered stone drains a somewhat increased fall is desirable, and the former must be kept free from obstructions. The mouths of all drains must also be kept well open.

The depth of the drains and their distance from one another will vary with the character of the land. On light open soils they should be deep and far apart; on heavy soils they should be nearer to the surface and one another.

Irrigation.—Irrigation is an absolute necessity in many Indian countries, and in those localities it will be of paramount importance in the work of the farmer. Through this agency worthless tracts are converted into rich farms.

Tell the students that irrigated lands are often better than lands depending upon rain for moisture. It is a well-known fact that in unirrigated land the question of a small or an enormous yield depends upon the copiousness of the rains during the seed or tuber-forming period, and the prosperity of the farmer on such land must depend upon the favor of the elements. The farmer who irrigates is above and independent of them. He controls the supply of moisture, and thus holds in his hand the greatest of the factors which go to make a successful season.
The subject of irrigation has been already briefly noticed in the introduction to this part of the course. It is one so broad and complex, comprehending as it does every part of the science of agriculture and varying in its practice and application with every change of climate and crops, that we can not here go into it deeply.

The farmer must endeavor to give the pupil a most thorough acquaintance with the practical features of irrigation, for this will be the foundation of his farming in those sections not having sufficient rainfall. Different crops and different soils require different times and manner of irrigating, and the farmer must be careful that the boy learns by the actual doing how to adapt his mode of irrigating to different kinds of land, and especially must he know the proper manner and time for irrigating the several crops. As has been before said, the work of irrigation must be performed exclusively by the boys under careful supervision. With proper instruction they should be able to tell when each crop and field should be irrigated and how. To test their knowledge, ask them when a particular field must be watered. Also tell them to watch carefully the various parts of the farm and notify you when they think any part needs irrigating, including the gardens, orchard, and fields of small fruit.

If any construction work is to be done, either on a new system or on an addition to the existing one, this will be an opportunity for giving the boys practice that must not be neglected, they doing the work instead of outside laborers. Among other benefits, this will teach them how to overcome obstacles in grading and how to do it most cheaply.

Claying and sanding.—Show the pupils how the adding of clay to sandy soils and the reverse may be made a very effective means of improvement. In the first case the soil is made more compact and retentive of moisture, and in the second it is made more porous and open. These processes, however, are very expensive and not often of any practical value to the Indian farmer.

Tillage.—Under this head are included plowing, harrowing, rolling, cultivating, etc., the ends of which are:
1. To break up the soil and make it mellow, so that the roots of the plants may more easily penetrate it.
2. To admit air.
3. To hasten decomposition of the soil and the resulting formation of plant food.
4. To kill weeds.
5. To regulate the supply of moisture.
6. To afford special treatment for particular crops.

Show the pupils that weeds are among the greatest obstacles to good crops with which the farmer has to contend, that they prevent the sunlight from reaching the plants, withdraw from the ground the moisture which the crops need, and exhaust the plant food in the
soil. They should be destroyed by cultivation when young and before injury is done to the crop.

Plowing.—Franklin's injunction to "plow deep" is one to be kept in mind by every Indian farmer, but it must be applied intelligently. The advantages of deep plowing are too generally overlooked by the average farmer. Just in proportion as the depth of cultivated soil is increased do you increase the available plant food, and consequently the productive capacity. Not only that, but deep plowing lessens the tendency to extremes in the supply of moisture. In wet seasons it aids drainage by providing more space for the absorption of the surplus water and in making it easier for it to pass off, and in times of drought deeply plowed soil has a larger supply of moisture stored away for the use of the plant and beyond the reach of the sun's rays. The roots of the plant are also enabled to spread over a greater area and sink deep into the ground, where they reach sources of supply which are comparatively unaffected by the sun in times of drought.

But the farmer must be careful to show that, while deep plowing is desirable in nearly all cases, it must not be attempted all in one season if the ground has been accustomed to comparatively shallow plowing. In this matter the safest advice is, Plow as deep as you can without turning up too much of the subsoil. Bring up from half an inch to an inch each year, and thus gradually deepen your soil. Take the boys to the field and illustrate this rule. Plow one or two furrows deeply, turning up much yellow dirt, and show the pupils how injurious this would be to the crops until it became properly assimilated. After the soil has been deepened sufficiently the subsoil should only be disturbed by means of the subsoil plow.

Teach that the best method of plowing is that which exposes the largest soil surface to the action of the air. Deep, narrow furrows thrown on edge do this best, and, generally speaking, this is the most advantageous method. Some exceptions arise when a special end is in view, as mixing fertilizer with the surface soil, the making of a good seed bed on an already loose soil, the destruction of weeds, etc. Illustrate this when the actual plowing is being done, letting the larger ones plow themselves, that the lesson may be more firmly impressed.

Show how surface drainage is greatly aided by plowing the field into what are called "lands." A land is the distance between the parallel ridges made by plowing. Properly plowed, they form gently sloping watersheds. The shorter the distance between the ridges the better the drainage. At each succeeding plowing the position of the ridges and shallows should be reversed; that is, the first furrow plowed should be turned into the shallow or gutter made the previous year, which will make the last furrow of each land be turned out of the apex of the ridge, thus transforming the ridge of the year before
into a gutter and the gutter into a ridge. Where the natural drainage is good, ridge plowing should not be practiced, as a level surface is more advantageous for many purposes. Illustrate as before when the actual work of plowing is in progress, using the different methods according to the character of the field and explaining to the pupils why the particular method is used.

Subsoil plowing.—By this is meant the breaking up of the subsoil without bringing it to the surface, and is usually done by a specially constructed plow following in the furrow of the ordinary plow. A very simple and economical method of subsoiling is to run a plow with a long, narrow shovel immediately behind the common plow. Any blacksmith can make the shovel, and the expense of subsoiling is thus made very light, while the advantages are sure to be recognized after a thorough trial. The roots of many of our common crops go down a great distance. Corn, for instance, often penetrates over 4 feet, and probably would go farther were it not for the extreme hardness of the ground.

When to plow.—Teach how very important it is to every farmer to know whether to plow in the fall or spring. The answer depends on the climate, the character of the soil, and the crop to be raised. In mild, rainy climates the washing of the rain makes fall plowing unprofitable to loose, sandy soils, but it is otherwise as to clayey soils. In cold climates plowing in the fall is of great benefit to the land, through the crumbling, disintegrating, and loosening effects of frost and cold and the resulting destruction of weed roots, and also through the long exposure of the land to the action of the atmosphere. Land thus plowed in the fall must be left in the rough, unharrowed state in order to give free access to the elements. Fall plowing also economizes the farmer’s time, and, with the exceptions noted, is strongly recommended. During the plowing will be the most suitable time to teach this to the children, on account of the value of the object lesson presented in making them understand it and impressing it upon their memory.

The subject of plowing is one of the most important of the agricultural course, notwithstanding it is usually the most neglected, and the teacher of farming must thoroughly impress the pupils with this fact, talking to them frequently on the subject and demonstrating the principles here outlined by the actual work of the school farm, taking care always that the attention of the students is kept on the subject and that they understand the reason for everything that is done. Separate experiments must also be carried on by the boys on a selected piece of ground, as there is no more effective way of teaching than this. Stimulate discussion on the methods of farming. Questions will be constantly developing as the farm work progresses, which will furnish never-ending topics of conversation and discussion among the boys once the habit is formed.
Harrowing.—The only rule to be given in regard to harrowing is that it be done thoroughly, for proper harrowing will make much less fertilizer necessary to obtain the same results. Show that its object is to level and pulverize the ground and prepare it for the seed, and to cover the seed after planting. It should be done as shortly before planting as possible.

Rolling.—Let the boys do the rolling themselves, as it is not difficult and they will enjoy the work. Make them understand how rolling is beneficial to loose and lumpy soils; that it crushes the lumps and presses the soil more closely about the seeds, thus bringing moisture to the surface and hastening germination. Also, by smoothing the ground it retards evaporation—first, by lessening the amount of surface exposed; second, by creating a coating which better retains the moisture; and, third, by offering less friction to the sweep of drying winds.

Teach that clayey soils should not be rolled when at all damp, as the surface soil is pressed into a compact mass, which excludes air and, drying, forms a hard crust. Show this by experiment.

Whenever the boys are engaged on any particular task, as plowing, cultivating, planting, etc., it will be very beneficial for the farmer to quiz them as to why they do it in a particular way. If they can not answer correctly, it may be well to give them time to look it up and think about it, or perhaps it will be better to make it the subject of a little talk, as at this time their minds will be more receptive and they will understand more clearly what they hear.

Cultivation.—Teach the meaning of what is known as "capillary attraction" and its relation to moisture in the soil—that it signifies the peculiar attraction existing between liquids and solids which creates a tendency in the liquid to rise when in contact with a solid of greater elevation. If a tube or space be small enough the liquid does actually rise to the top, as in a lamp wick. So where soil is fine and allowed to stand for some time small tubes form and the water rapidly rises to the surface and escapes into the atmosphere. Cultivation breaks these tubes and loosens the ground, thus arresting evaporation and preserving the moisture. Demonstrate by experiment with two small pieces of ground, cultivating one frequently and leaving the other undisturbed, and after some time has elapsed noting their relative dryness.

As the roots of most crops completely fill the soil and approach very near the surface, this cultivation should usually be shallow, as otherwise many roots will be destroyed. Again, deep cultivation exposes too much of the moist earth and helps to dry up the ground. In dry seasons frequent cultivation of the surface soil tends to form a dust blanket, which retains the moisture in the soil beneath and is of much benefit in times of drought. However, while the plants are small and rains are frequent deep cultivation is the most advantageous.
In addition to retaining moisture the chief benefits of cultivation are the admission of air to the roots and the destruction of weeds.

Dry-weather farming.—In all sections where there is any danger of drought, or where there is not a plentiful supply of rain all through the season, or where it is advisable or needful to economize the amount of water used in irrigation, it is desired that the school farmer put in practice the following method of cultivation and preparation of the ground. This method has been in successful use for many seasons in some of the driest portions of the country, and it is confidently expected that it will prove of very great benefit in those localities which suffer from lack of rain during a portion of the year.

One large field will be sufficient to select for the inauguration of this method, but the work must be given the most careful attention and the directions here given strictly carried out. The proper time to begin the work is in the fall.

First plow the field 4 inches deep and harrow it thoroughly with a coarse-tooth harrow (a disk harrow is the best). Then go over it again with a small-tooth harrow until the ground is mellow and thoroughly pulverized to the entire depth of 4 inches. Now plow the field again to the depth of 8 inches, thus exposing 4 inches more of coarse earth. Use the same process in pulverizing this 4 inches that was used with the first, and then plow the field once more, this time to the depth of 12 inches. This will bring up another 4 inches of unpulverized soil, which must be treated as before, giving us a thoroughly pulverized seed bed 12 inches deep. Go over the field with a light roller to make the surface even and prevent the fall and winter winds from taking up too much moisture. Most of this work can be done by the large boys, under the careful supervision of the farmer.

When spring arrives run over the field with a steel-tooth harrow to prepare it for planting corn. Cultivate the corn frequently with a cultivator to prevent the growth of weeds and to keep the surface soil well stirred up. This surface soil will gradually dry out and become a complete mass of dust to the depth of possibly an inch and a half. This is called the dust blanket, and it prevents the moisture from escaping from the soil beneath. Thus the moisture stored up in the winter and spring is preserved and utilized only by the growing crop. It has been found that in this way a good crop can be raised in the driest season, and the farmer is also independent of uncertain weather conditions.

The fall following this cultivation, put in rye, wheat, or some similar crop by drilling it in between the rows of cornstalks with a one-horse hose drill. The seed will grow without depending on any immediate rains, as the ground has already retained sufficient moisture. The cornstalks left standing will be useful in preventing the winds from
drying up the ground around the roots of the wheat and also prevent the snow from being blown away. In this way we get all the moisture possible.

The fall following the harvesting of this crop of wheat plow the ground 6 inches deep and pulverize in the same manner as before. The ground is then ready for any rotation of crop desired.

At the next plowing time plow to the depth of 12 inches and repeat the process of pulverizing with the upper 6 inches.

By these means a mellow, pulverized seed bed a foot deep is maintained, which will be found to retain its moisture throughout the season. Of course it is not expected that the ground can be plowed in divisions of exactly 4 inches or 6 inches each, and it may be inadvisable to go to the depth of the entire 12 inches at first, but the farmer should approximate these figures as nearly as possible, and be governed by the character of the land as to the ultimate depth to be plowed. But while it may be unwise to plow a foot deep at first, the soil should be deepened a little each plowing until it is at least a foot deep.

The large boys should be able to do the greater part of this work under the farmer's direction. Show them the advantages of the method, making them understand the reason of every step as it is taken.

**Rotation of crops.**—The practice of rotation of crops is very generally neglected among American farmers, notwithstanding its great importance. The reason of this is to be found in the general ignorance of the principles of agriculture prevailing among our farmers. The Indian boy must be given no such excuse, and the farmer will make this subject the topic of many talks and illustrate its advantages by its use in the work of the farm.

Different crops draw from the soil different elements, and as the plant uses up food faster than the soil can produce it, repeated planting in the same places soon exhausts the required elements, and a change is needed to give the elements opportunity to prepare new material.

The roots of many staple crops remain near the surface, while others send many of their roots deep into the subsoil. The deep-rooted plants are of benefit by assisting in the breaking up and decomposition of the subsoil, thus deepening the soil; by bringing to the surface many valuable elements contained in the lower soils, and by recovering the substances which long-continued rains have washed down into the subsoil. Therefore, the deep-rooted and the shallow-rooted crops should alternate, as clover and wheat.

The growing of one crop on the same land continually promotes the growth of injurious worms and insects, while, on the other hand, a rotation destroys them by depriving them of their special food.
Most annual crops are harvested comparatively early, leaving the ground bare for the balance of the season, which is undesirable on account of the loss of plant food which results. A proper rotation keeps the ground under cultivation and either retains or uses this plant food.

Again, rotation of crops subjects the soil to different kinds of cultivation, promoting decomposition, admitting air, and otherwise enriching it.

It also gradually rids the land of weeds by destroying them before they go to seed.

And, lastly, this method economizes the farmer's time and cheapens the cost of farming. When a few crops only are produced the work is crowded into brief periods and the farmer is obliged to hire help for a time and then remain idle himself for considerable periods. By producing a variety of crops which demand attention at different times the work is distributed more equally throughout the year, and the labor of the farmer and his horses can be utilized to the greatest possible advantage.

In practicing rotation of crops the farmer must consider, first, the difference between the several crops in regard to the kind of plant food required; second, their variation as regards the depth to which their roots penetrate, and, third, their distinction as regards manner of cultivation.

This subject may be illustrated in the boy's garden in addition to the work on the farm, and the pupil must be drilled until he is master of it.

SIXTH YEAR.

From this time on the boys will be old enough to assume responsibility and do a large share of the actual work in caring for stock, stables, and barn, in preparing the ground, and in putting in the crops. The boy's judgment must be exercised, and along this line special stress must be laid this year. He knows how to plow and is old enough to do it thoroughly; he knows the value of carefully preparing the ground for crops, and will have much of this to do this year, since the school must endeavor each year to raise larger and better crops. The boys will therefore assist in all farming operations, but the farmer must, by carefully carrying out a rotation of crops, endeavor to lead the boys to independence of thought and action by having them plan the work to be accomplished. Let the suggestions come from the boys; encourage them to make suggestions; cultivate a spirit of planning for the future; make the boys feel the necessity for looking ahead; invite suggestions in improvements over last year's work; managing the stock; doing the daily round of work, in field and garden; how to make it pay a little better this year; how to manage to raise a little more or a better grade than last year, and to have more to sell.

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The importance of these talks with the boys can not be overestimated. The farmer must see that the boys have time to devote to the work at the forge and in the carpenter shop, since the time is fast approaching when the boy will leave school, and the responsibility rests upon the farmer to see that these boys are given the requisite training to repair broken machinery, shoe horses, mend wagons, and keep buildings in repair.

Many talks on the breeding of animals will help the boy in deciding early in life that it is most desirable to keep strong horses for heavy work and endeavor to have them, which can be accomplished by breeding wisely. Cows that give an abundant supply of milk and pigs that attain the greatest size all show the effects of breeding, and this is a lesson which needs to be impressed by precept as well as in the most practical way. The judgment must be trained in the feeding of stock, giving variety and at the same time feeding that which will supply the animal body with all the requisite constituents. His judgment must also be trained in disposing of the manure which accumulates around barn and stables.

Help the boy to be self-reliant. Remember that he is no longer a child in years and make him as well developed mentally as nature has physically; it rests with you to train him in habits of economy and industry, showing him to spend a little thought on every piece of work undertaken and not to give up until he has made it a success.

Study the habits, needs, and wants of horses, cows, swine, sheep, goats, and poultry with the pupils, having in view the improving of the stock and applying intelligent and business methods to their breeding, training, and care. Impress the vital importance of careful breeding to maintain strong, healthy stock, showing that good healthy stock consumes but little, if any, more provender than indifferent grades, and the gain from keeping up the grade repays twofold in the work accomplished by said stock, as well as in the prices secured for the same when putting them on the market.

Constantly show that a number of dogs and ponies consume and do not add to the revenue of the family.

The income from raising poultry will be a valuable lesson for these pupils. Poultry not only furnish supplies for the family, but often develops a lucrative industry. Chickens are very easily raised. With little expense turkeys and guineas can be added to the barnyard. Pekin ducks do not require a stream of water near. In locations where water is at a convenient distance other grades of ducks may be raised, and also geese, which yield a revenue every year in feathers alone.

In countries where sheep and goats can be raised the importance of this industry must be shown.

Swine can be raised anywhere. They thrive on the refuse of the house. Everything that is discarded, even the water in which the
dishes have been washed, may be given to them. With proper care and feeding they always command good prices.

The growth of the animal is more complicated than the growth of the plant. The animal is built up and nourished by the consumption of substances ready formed in plants, or which have been derived from them, their food being of two kinds, water and dry matter.

Explain the special uses of fodder, which includes the cornstalks, straw, and hay; and the "feeds," as the cereal grains, buckwheat, pease, mill products, etc.

Show how the quality of hay depends upon its kind and variety, the character of the soil, stage of growth at the time of cutting; also the method of curing. The richer the soil the richer the hay. Teach the best time for cutting hay and how hay subjected to frequent rains and, in consequence, to increased handling, suffers great loss.

The relative values of fodder.

Ensilage as a food.

The value of tubers and roots, and how, like ensilage, their value depends upon their succulence, palatability, and high rate of digestibility and good effect upon the animal system, as much as upon their food constituents.

Show that the most important of all feed are the grains or seeds of the cereals, mill feeds, and refuse products of bran and middlings, and of gluten foods. Hominy and cotton-seed meal and others are valued for their content of fat, protein, and carbohydrates.

Show how the cutting and crushing of coarse fodder favorably influences the rate of digestibility.

Show the relative digestibility of the different foods. Explain carefully how the feeding of the animal replaces the natural wastes of the body consequent upon the exercises of the vital functions (of the production of milk, flesh, fat, wool, etc.), to increase product and work.

The proper proportion of food constituents required for the different purposes of feeding.

Feeding standards, and their usefulness.

The economy of sometimes selling grain and buying feed.

The manurial value of stock and the care and management of manures.

A manure being anything that increases the production of farm crops, show how the farm-yard manures vary in composition and how that from young animals is less valuable than from full grown.

Explain the difference between hot and cold manures, hot manures being especially valuable in making hotbeds in early spring.

Explain the liability of manures to fermentation, which is loss in nitrogen, this being changed into ammonia, which escapes into the atmosphere. How this may be prevented by keeping manure well packed and moist, the loss being greatest where manure is allowed to lie in loose heaps.
Where special crop farming is carried on the soils should be abundantly supplied with active plant food.

Hotbeds.—Farmers will be able to show the pupils the best practical way of growing plants from seeds in a hotbed or box, so as to have enough plants for the school garden. The thrifty farmer does not depend upon the store to buy tomato, cabbage, and other plants by the dozen nor onion sets by the bushel (which may have been grown from inferior seed) for starting his garden, but will grow the same himself and have them ready when he has need for them. This is what the pupil will want to do in his own home after leaving school, and to do so successfully he must needs have instruction and experience now. It will be wise to buy new onion seed from time to time to use for planting to raise the "sets," since seed produced repeatedly in the same place deteriorate.

FRUIT GROWING.

In some sections where fruit growing is the main industry followed it will form the most important subject for the farmer to teach, as stock raising is in other localities. His object is to fit the Indian to be able to support himself in his own home, and hence he must adapt the means to the end.

The school probably already has some fruit trees and perhaps a good orchard, so that the farmer can begin at once in training the pupils in their care and management.

Teach the importance of tilling the land in the orchard and especially around the roots of the trees. Show the many ways in which this is of benefit to the trees and fruit. Many pages might be written on this point, but the farmer must be referred to the many excellent works on the subject.

Train the boys in pruning the trees properly and at the appropriate season, at the same time explaining to them the benefits to be derived thereby.

New orchards and new fruit plantations must be laid out and the work used as a means of educating the pupils.

The planting of fruit grounds; choice of varieties; selection of plants; laying out of the orchard; planting.

No varieties should be chosen for a permanent orchard that are not known to grow successfully in the particular locality, however it may be done for purposes of experiment. A goodly number of varieties should be selected, as this plan usually proves the most profitable, distributes the work of caring for them throughout the year, and gives the pupils knowledge and skill in the growing of many kinds.

When the planting of the young trees is in progress, the pupils must be always on hand and understand the reason for every step that is taken, helping in the work whenever possible.
The orchard or plantation should be laid out according to some definite and prearranged plan.

Care of the young trees after planting; pruning.

Plowing in the orchard; when beneficial. Other cultivation.

Diseases of trees. Remedies.

Worms and insects. Remedies. Spraying; when and how to be done. Demonstrate by actual work and experiment.

Grafting. Advantages.

Harvesting and marketing the fruit. When fruit should be picked, and how. Boys will do most of this work. Should invariably be picked by hand unless for manufacture into cider, evaporated stock, or some such use.

Care of fruit after picking. Packing and preparing for market. Storing for winter.

The farmer has given the boys careful instruction in plowing, using one horse at first, showing the various uses of the different kinds of plows, the necessity for keeping plows free from rust and well sharpened. The strength of the pupils having increased has led to giving them this year the breaking up and preparing the land for the crops and cultivating and harvesting the same.

Give the boys much experience in making hay, and at schools where baling is done they may assist. They are now experienced in raising and harvesting the crops peculiar to their respective localities; also in the care of farm implements, machinery, etc. The importance of keeping the harness well oiled, in good repair, and in its proper place, is a lesson all boys must learn.
The general care of the barn and barnyard will be impressed every day.

It will be necessary to frequently show the importance of keeping the farm in good repair, mending fences and gates, keeping doors on hinges, maintaining a neat appearance of the barn and outbuildings.

The proper housing of grain is another important subject on which to give advice to the young farmers.

Small fruits: The culture of strawberries, currants, grapes, and all small fruits should be advised and practiced in all schools.

The orchard is one of the important lessons in the course in farming. The health, as well as the revenue of the family, is greatly improved where fruit is one of the products of the farm. Trees must be set out every year and the pupils given practical lessons in caring for them. Spraying, at the proper season, keeping the roots free from earthworms, and their general care should be taught.

In the dairy work the lessons to be impressed are cleanliness and careful attention to food and stalls of the cattle, the pupils actually doing all the work from milking the cow to marketing the butter. Both boys and girls must take part in the dairy work. Show the importance of clean hands in milking and clean vessels also. Impress careful milking, being sure that all the milk is taken from the cow, the last drawn, or "strippings," being the richest in quality.

Show that milk is a perfect food, easily digested, and containing all nutriment necessary to sustain life, and should be handled carefully and hygienically.

Show the difference in cattle, explaining how some have a tendency to secrete milk, while in some the tendency to form flesh and fat is largely developed. The dairy breeds are also divided into two classes, those giving a large quantity of average quality of milk and those which give a smaller quantity of a higher quality, thus showing the influence of the breeding.

It will be necessary to repeat many times the instructions as to feeding, to impress that "by proper food" is meant food that is clean and wholesome, and that the influence of food is the greatest factor in determining the profit derived from the dairy.

Hay that is mixed with weeds or improperly cured or moldy will result in a poor quality of butter and milk. Demonstrate how feeding affects the flavor of the milk; that cabbage, turnips, etc., should be fed immediately after milking.

Good, pure drinking water for cows is another essential. Decaying straw or hay used for bedding often taints the milk. Clean bedding must be insisted upon. Also the management and care of the calves.

After milking, the care of the milk is an important consideration, clean vessels and clean surroundings being highly important. Prop-
erly airing and sunning milk vessels should be insisted upon, and the milk always kept covered.

Skimming milk and churning, care of the butter, showing just the right amount of salt to be put in and how to work the butter well, how to use coloring matter if desirable, the packing and storing are all practical questions that must be solved by the pupil by actually doing the work.

The profit and success of dairying depends upon a number of conditions which should be carefully considered.

The care of all animals should be regular, punctual, and kindly.

General advice relative to and practical experience in marketing crops will be given this year.

Each school is expected to raise large crops for the market, and at the same time supply the school table with a variety of vegetables and fruits, and in accomplishing this the boys will have received practical lessons in farming.

This year the boys should be given practice in making estimates and plans for next season’s work. They must be taught the quantity of wheat and other grains required to seed properly an acre of ground, and then made to put their knowledge into practice by taking particular fields and figuring the amount of seed to be used. Endeavor to put the boys in the position of farmers having land of their own to manage. For example, in the fall the teacher should require each pupil to submit a plan for conducting the farm for the coming year, giving in detail the crops to be put in each field and portion of the school farm; in doing which they must remember the principle of rotation of crops. This plan submitted by the student should go into every necessary detail; and the work to be done with each particular field clearly outlined, as, for instance, the quantity and kind of fertilizer to be applied, and the manner of cultivation, together with all further details that the farmer may deem necessary in setting forth on paper the work of a year on a farm. In doing this the boy will be obliged to draw upon and exhaust everything he has learned on the subject, and he will be stimulated to additional study to inform himself in those respects in which he is lacking. It will be a practical application of his entire fund of knowledge on the subject of farming and will fix the principles firmly in his memory. It will also show the teacher the measure of success he has attained in his endeavor to make the boy an intelligent practical farmer, and in what respects the pupils are still deficient.

Compare the plans submitted, in the presence of the boys, explaining their good and bad points and how they may be improved. The farmer may be able to adopt a good many of the suggestions of the boys and thus make the work more interesting and instructive to them.
Many of the schools have very large tracts of land, as, for instance, at Chillico, Okla., and from such schools in particular great results will be expected. Farming here must be conducted on a large scale and every boy of sufficient size and strength made to take part in the work. These schools will naturally be expected to become the leading agricultural schools in the service and models and examples for the guidance of the schools having less acreage. Efficient assistants will be provided by the office whenever necessary and no effort omitted to raise this branch of Indian training, so vital to his future welfare, to the standard of excellence its importance demands. All the forces of such schools should be brought to bear upon teaching every branch of agriculture in the most approved way. With extensive pasturage, a large herd of cattle could be grazed, giving pupils practical experience in handling cattle, also in maintaining a dairy where breeding and the daily care of the animals and barns would be among the lessons taught. The benefits of breeding should be clearly demonstrated by the increased amount of milk and butter produced each year. In this connection butchering should also be taught in a humane, hygienic manner; cutting up the meats in the proper way, and saving and shipping the hides.

A large number of hogs should also be raised and shipped from a large agricultural school.

Ample opportunity will be offered for cultivating a variety of crops, practicing a systematic rotation in what can be best grown. Such a farm will necessarily own a large number of farming implements, which must be kept in good repair and properly housed. Many horses will be necessary to conduct farming operations on such a large scale, and their daily care will be an important part of the training given.

The garden should be an important feature. With ample room, large quantities of vegetables should be raised and the benefits of a hotbed proven by raising much garden truck under glass and having vegetables ready to set out as soon as the frost is out of the ground.

The opportunities for extensive orchards, raising all varieties of fruits that the latitude will permit, and also for the raising of large quantities of small fruits are exceptionally fine at schools of this character.

Extensive vineyards should also be maintained. The grounds should be beautified with flowers of all varieties that will thrive, and shade trees planted in many places, the pupils being taught their use and how to care for them.

These large agricultural schools should be able to supply all the smaller schools in the neighborhood with cuttings, plants, young trees, grapevines, flower seeds, onion sets, etc., and to be an example to the surrounding country. They should be a sort of agricultural experiment station where agriculture is conducted along the most approved
lines. It is the object in maintaining such schools to fill them with pupils from the smaller reservation schools, where they have learned practically the same crops, and yet at these larger schools everything should be done on such a large scale and in the most perfect manner, so that the pupil's experience will be broadened and he will be compelled to shoulder responsibility, the most important lesson he must learn in preparing to farm for himself. With such a large amount of work to be handled, responsibility must of necessity be placed upon the oldest and most experienced pupils. They must be put in charge of much work that has to be done, and the farmer must make them feel that the success of their special piece of work depends upon their watchfulness over the details of said work and in the time and labor that has been expended in its doing. This lesson will be of incalculable value and will be one of the strongest props put under the boy in helping him on to independence of thought and action and to ability to plan for himself.

At the large agricultural schools the model farm idea can easily be carried out, there being sufficient land to set aside 4 acres, giving it into the hands of a few boys, who will be advised to fancy themselves at their own homes, and who must map out a series of crops and work for the different seasons, as they would do were they tilling their own soil. This lesson will be brought home more closely by having a small barn on this model farm, keeping two horses, one cow, and one pig, and by making the produce of this farm feed the stock and have some left to sell.

The garden truck to be raised and the rotations of crops, should be planned out on paper before starting in, and the work must be carried on with the advice and direction of the farmer, whose opportunities here are great for giving the boys valuable instruction and help.

The opportunities are no less for girls than for boys in an agricultural school of this size. The judgment must be exercised in using wisely the large quantities of material to deal with and in planning for the proper storing of the products of the farm. Vegetables and fruits should have been raised in sufficient quantities to supply the table for the entire year. Apple and other fruit butters must be made, fruits preserved, pickles and jellies made, fruits and vegetables canned and dried, thus giving the girls a wide experience in husbanding their resources and putting by from one season for the next.

Large numbers of fowl should be raised, and of all varieties, and this is largely the work of the girls. The housekeeping in this establishment is an important matter and gives girls a wide field of experience in learning to control themselves while directing and controlling others.

In thus describing some of the work to be done at the schools having large farms we must not be understood to imply that such work is to be neglected at schools having small areas of land. Quite
the contrary. The farmer having a small area of land must give the boy most careful training in managing small crops, and thus prepare him to benefit by the instruction he will receive when transferred to the school whose resources are greater. Only by careful training in the smaller schools will he be fitted to enter the larger ones. All farm work in the small schools will be on a small scale and will be of great value because it will be like the farm at home. Some cattle may be kept; also hogs and poultry and splendid orchards be set out. Several crops should be raised each year. Gardening should receive careful attention, though so much ground may not be devoted to it as at a larger school. Horticulture must not be neglected, vines and flowers may be planted at the base of trees in the yard, and the school grounds may be made pretty and attractive.

In other words, the farmer must use his limited facilities to the best possible advantage and make the utmost use of every acre at his disposal.

CONCLUSION.

In this course of study on agriculture no attempt has been made to detail the entire amount of instruction to be given by the teacher of farming. To do this would take volumes, and the limited space has permitted only the briefest outlines of the subject, with occasional amplifications on points of special interest. It is believed that enough has been said, however, to give the farmer a comprehensive view of the field to be covered and a clear idea of the methods to be adopted.

The works recommended, and which will be found in the school library, will furnish abundant material and information on every topic in the course, and the farmer will be expected to make constant use of them in his work.

The farmer is expected to carry out faithfully the course here laid down, and as much more as he has time for. In some sections fruit-growing is the most advantageous industry for the Indian, and here, of course, particular emphasis will be given to the subject. In other localities stock raising predominates. So the farmer must take into consideration local conditions and modify his work accordingly.

There is no department in the Indian education exceeding in importance that trusted to the farmer’s care, viz, the teaching of agriculture. Upon the result of his work more than any other depends the advancement of the condition of the Indian. The vast majority of the Indians must support themselves, if they support themselves at all, by the working of the soil, and whether they succeed in doing so or not rests in a large measure with the training they receive in school.

One thing the farmer must ever bear in mind, and that is the object at which he aims, viz, the making of Indian boys into industrious, practical farmers and self-supporting citizens.
ARITHMETIC.

All thoughtful teachers seemed agreed that arithmetic should be taught with objects, not only in the first grades, but to a certain extent in all grades. Of course, the objects must be handled and compared by the pupils.

Anyone who has studied children has seen that they have a tendency to handle things. This is nature's attempt at obtaining knowledge by sense perception. The Indian child, because of his unbounded curiosity, has a greater tendency in this direction than other children.

This method of teaching by handling should be pursued till the knowledge of relations is so thorough that the child no longer needs objects to reveal them.

In the first years of number work, sight, hearing, touch, should all be exercised. There must be expression through the hand as well as through the lips.

A teacher should come to her class with a thorough understanding of the topic of the day. So prepared, she will appreciate these words
of Professor Howison: "Not only in mathematical but in all elementary teaching, though in elementary mathematical teaching preeminently, the first thing is to get the pupil perfectly familiar with and as nearly as possible infallibly accurate in fundamental facts and operations."

I am aware that it is possible to weary the Indian pupil beyond endurance by this, and therefore warn the teacher to keep the fatigue point in mind.

Let all problems be practical and so simple that the child has no difficulty in stating them before he performs the operation.

Aim at only reasonable facility on the part of the child, but he must be accurate.

All exercises in fractions and per cent should be confined to small numbers and to subjects likely to come within the pupil's experience. Number work involving a labored process of reasoning as in "catch examples" should be discarded.

Oral work should not be dropped when written work begins, but should be kept up in all grades. The "mental arithmetic" is a book for any year after the second year.

Teach processes rather than rules.

The child should do the work always, not the teacher. "The test of real mastery is that the knowledge shall be produced * * * without any help at all."

**NUMBER WORK.**

*First year.*

When a child enters this grade he probably has the idea of one, but the teacher must find this out.

She is supposed to have a supply of objects such as beans, corn, stones, pencils, toothpicks, etc. Ask the child to bring one stone. Has he one top? Bring it. One marble; hold up one hand; so the child learns, or shows that he has learned, one. Put the figure 1 on the board.

In the same way take two. How many feet have you; how many eyes; how many hands? Show me as many beans as you have hands.

When the child has learned two—that is, one and one—of the same kind put together—have him take one away from two.

Be sure that he not only knows how many, but sees that they must be of the same kind. Put the figure 2 on the board.

Then give little problems taken from everyday life, and teach the children to give them. Francesca has one flower and Manuella has one flower. How many flowers have both? Jose has one top and Juan has one top. How many tops have both? Take away one flower from two flowers and one top from two tops.
Or Francesca can draw a bird on the board and some other child can draw a bird. How many birds are there? Then erase one bird. How many birds remain?

When this is well learned, place on the board the problem and let the child write the answer beneath.

In the same manner take up three. Find three blocks, three pencils, or three beans, and show that three is two and one. Take two stones in one hand and one stone in the other hand. How many stones? Put the hand with one stone behind you. How many stones remain?

So test the children till at a glance they recognize a group of three.

Finally place two and one on the board, thus: \( \frac{1}{2} \), and let the child place the answer beneath.

In the same way take up "four." Have the child put one book and three books together, and tell how many books there are.

Let him draw on the blackboard three short vertical lines. How many lines? Then one more line. How many lines? Then two lines and two lines are how many lines? Write the figure 4 on the board.

Before closing with four, write on the board \( \frac{3}{2} \), and have the children write the answers beneath; also subtract one from four, and two from four. Do the work also by using the signs + and −, as 3+1=4; 2+2=4; 4−1=3; 4−2=2.

Proceed with five as with previous numbers, and so on to the end of the year, when it is expected that the child will have carried number work to 10.

Give many problems, and sometimes reverse to recitation; have the children catechise you. The children should furnish most of the problems.

In teaching to count to ten, the test of success is the child’s ability to discover readily any number of objects to ten, but do not attempt the instant recognition of any group of more than four.

The child should also be taught ordinal numbers as follows:

1 is the first number.
2 is the second number.
3 is the third number.
4 is the fourth number.
5 is the fifth number.

Point out the first number, fourth, third, fifth, etc.

What number is the third number? The second? The fourth? The first? Etc.

Who is the first person in the class? The second person? Etc.

What number comes after 1? After 3? After 2?
What number comes between 2 and 4? Between 1 and 3?
The child should now learn something of Roman notation, so that he can recognize the numbers of the lessons, as well as the pages, in his readers.

Along with this work it will be profitable to conduct special exercises adapted to sense training and enlargement of the judgment, in which faculty the Indian is deficient.

While a more systematic study of solids is taken up after a year or two, attention can now be given to many things observable in the schoolroom and about the house; they can be compared as to their faces, edges, corners, etc., and those that are alike may be gathered into a group.

Have a child close his eyes and feel an object, then tell what he thinks it is. When there are several small objects of the same kind, let him tell how many he thinks there are, and then open his eyes and see how near the truth he came; also which is largest, which smallest. Strike different substances and ask the children to tell by the sound what was struck—eyes closed, of course. Strike a succession of objects and ask the children to tell what and how many things are struck. Drop something and ask them to tell how far it has fallen by the sound. Recognize the other children by their voices.

Forty-five fundamental combinations:

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SECOND YEAR.

In the preceding year the pupil has learned 25 of the 45 primary combinations of numbers.

The first work of the year should be a review of the last year's work; then teach the remaining 20 combinations. With these well fixed in the memory, the Indian child has a large part of the arithmetic he will ever need in life. These combinations may be compared to Dr. Hill's "pint of beans," with which he says arithmetic may be taught.

Teach by the method outlined for the first year. The child must make actual combinations and find the answers. He must state problems, very simple ones, but they must be his. Special attention should be given to the habit of problem making and of stating problems in distinct tones. The child should readily state problems for every one of the 45 combinations. This is not only necessary as an application of numbers, but language work is pursued as well.

Thoroughly memorize each step before advancing, and keep reviewing, so that nothing slips out of the mind.

This is especially necessary with Indian children, because in their isolated homes they have not the frequent practice in number work that a child has in a community where stores and commerce abound.

In adding, read or think the lowest number first. Toward the close of the year drill on the board and slates can be given in numbers consisting of two figures, but the sum of the units should not exceed nine.

Practice counting by adding numbers to ten. For instance, in expressing eleven, say, one ten and one; twelve, one ten and two; twenty-one, two tens and one. This shows the principle of the combination. There are various ways in which the teacher can explain it—make marks on the board, ten vertical marks, then one mark. Show that the one, the unit, is expressed by writing 1, and the ten is expressed by writing 1 at the left of the first 1. In 25, 5 represents five units and 2 represents two tens. There should be drill on this, and later in hundreds and thousands.

Introduce fractions like $\frac{1}{2}$ and $\frac{1}{3}$, etc., where they can be brought in naturally, and teach by the use of objects.

Teach the pint and quart with actual measures; also the inch, foot, and yard.

Where sewing material is given the school it is well to have each child measure his required quantity and then label it, giving the quantity and his name.

Every schoolroom should be furnished with foot rules, yardsticks, and surveyor's chain, the common measures for liquids and for grain, and a pair of scales; bags filled with sand can be used for weights. It will help the child to handle the things, become familiar with the
names, and learn the smaller denominations in anticipation of their extended study later.

Great use may be made of the ruler for the exercise of the judgment. Make lines of different lengths, or squares and other rectilinear figures of different dimensions. Ask the child to estimate the length of one line, then measure. The length of the shorter line, then measure. What the length of the side of the larger square? Child measure. What of the smaller square? Measure.

In this way he learns to measure the length of objects and to judge distances with much skill.

Third year.—Review work of the previous year, telling at sight the 45 primary combinations.

Experience seems to show that the Indian child readily picks up a "series idea," as counting by adding twos, counting by adding threes, etc.

In making up "constant addition," as this is called, objects will still be needed to make the meaning of the series clear.

The teacher may write on the board a column of twos, the sum of

\[
\begin{array}{c}
2 \\
2 \\
2 \\
\end{array}
\]

which shall not exceed 10, as: 2. Then with pointer in hand she counts, beginning with the lowest figure, 2, 4, 6, 8, 10. With blocks or beans the child makes up this series, assuring himself of its accuracy. He memorizes it, both ascending and descending, writing it on slate or paper for this purpose.

Then the teacher puts the other series on the board and with a pointer counts. The child with his blocks counts out the series, 1, 3, 5, 7, 9, puts it on paper, and learns it ascending and descending.

The two series, 2, 4, 6, 8, 10 and 1, 3, 5, 7, 9, are what should be fixed on the eye and the mind.

A column of threes is treated the same way, the teacher pointing and counting 3, 6, 9, 12, after which the child finds it for himself with the aid of blocks, and then learns it ascending and descending. Then a column of threes, except the first figure, which shall be 2 or 1.

After the different series of threes are learned, drill on columns-of threes, twos, and ones, written irregularly.

In the same way take column of fours, going to 16; column of fours, except the first figure, which shall be 3, 2, or 1. Later drill on an irregular column of fours, threes, twos, and ones.

Same method with 5 going to 20, and with 6 going to 24.

In connection with each series use problems which apply the series. The recitations may be varied by writing the numbers in a circle, and the teacher can go round and round it with a pointer.
Fractions:

How much is \( \frac{1}{2} \) of 2, 4, 8, 10.
How much is \( \frac{1}{3} \) of 3, 6, 9, 12.
How much is \( \frac{1}{4} \) of 4, 8.
How much is \( \frac{1}{5} \) of 5, 10.

The work of the second year, by geometrical figures on the board and with blocks at the seat, should be continued. Each child should have a small box of blocks out of which he can build geometrical bodies.

If, as some one has said, it is easier to see the relation of surface to surface and line to line, than of one number to another, the study of ratio may now be profitably pursued as supplemental work.

Having placed on the board lines of different lengths, for instance, a 12-inch line and a 6-inch line, ask the ratio of the shorter line to the longer line. \( \text{Ans}. \frac{1}{2} \). Then of the longer line to the shorter line. \( \text{Ans}. \, 2 \). Make squares; the surface of one square double the surface of the other square. Ratio? The surface of a square four times the surface of another square. Ratio? Be sure to keep within the child’s knowledge of fractions.

Drawing and molding in clay can be practiced along the same line. Study the sphere and cube, first as wholes, then as to faces, edges, and corners.

Linear measure, by using problems suggested by sewing material and cutting of garments for children.

United States money, with actual money or toy money.

FOURTH YEAR.

Review the work of the last year, in constant addition.

Take up 7 and count to 28; after learning the ascending and descending series, apply problems.

Then add successively columns of sevens, except the first figure, which shall be 6, 5, 4, 3, 2, or 1. Too much drilling can not be done.

If the teacher bears in mind what a child learns in the second, third, and fourth years of number work is what he will chiefly use in after life, she will see the need of the most thorough teaching.

Proceed with 8 and 9 as with the other numbers, finally carrying all as far as the old-time tables go.

Then review and review! Try always to have the variety which is necessary to insure interest and attention.

Carry fractions to eights and ninths, and denominate numbers a few steps above what was learned in the last grade.

Teach Roman notation to C. Elementary arithmetic can be used for seat work and drill.

Study the hemisphere and triangular prism as wholes and with reference to surface. Show what is the boundary of a square, the boundary of the school yard, and of small fields. Drill in the 45 combinations.
Time: Draw a clock face with the minute hand at XII and—
   The hour hand at I. What time is it?
   The hour hand at III. What time is it?
   The hour hand at IV. What time is it?
   The hour hand at VI. What time is it?
   The hour hand at XII. What time is it?

Draw the hour hand between XII and I—
   The minute hand at I. What time is it?
   The minute hand at II. Time?
   The minute hand at X. Time?
   The minute hand at III. Time?
   The minute hand at IX. Time?

Draw a clock face to read 10 minutes to 5 o’clock.
How many hour spaces on the clock face?
How many minute spaces on the clock face?

FIFTH YEAR.

Multiplication and division:
Show the child that multiplication is the same as “constant addition.”
The table of 2 in multiplication is the same as the series made by adding 2. Illustrate.
Teach the terms multiplicand, multiplier, product.
As in addition, the child should make the tables, using objects and writing the results. After calling to mind the series made by constant addition of 2, he can repeat, one two, 2; two twos, 4; three twos, 6; four twos, 8; five twos, 10.
Thoroughly memorize the tables.
In slate practice with the multiplier the pupil should be very rapid in using multipliers expressed by one figure before he attempts work where two or more figures are used.
Division should be taught as reverse multiplication. It can be shown that 4 contains 2 two times, since two times two are 4; 6 contains 2 three times, since three times 2 are 6.
Multiplication and division should be taught together, or nearly simultaneously.
Multiply by 2 and drill until the process is well acquired, both as to table and in problems, then divide for quotients of 2.
Have examples put on the board, using the signs × for multiplication, and ÷ for division.
Multiply by 3 and drill as with 2, getting accuracy and speed in reciting the tables, then divide for quotients of 3. Apply both processes in many problems. Pupils need not go higher than three figures for division. Do not have large dividends.
After sufficient drill in blackboard work the teacher will show the pupil how to carry where the product is expressed by more than one figure.

Division where there are remainders need not be taught till the ten tables are learned.

Reduction, addition, and subtraction of fractions containing denominators not greater than 9; also denominate numbers studied with the actual measures. Review often the forty-five combinations.

**SIXTH YEAR.**

Do enough work for a thorough review of fundamental processes, then take up factoring and finish the elementary arithmetic. This may be too much work for some pupils, but not for all.

If there are children who can not keep up, with such be slow and sure.

Do not attempt much memorizing of rules. Where the principles are understood, the rule will be of little practical use. All teaching should be of such a nature as will best fit the child to cope with his environment.

Make use of problems drawn from daily life of the Indian man and woman. Teach the boys how to invest sums of money in cows or
sheep; how to estimate the number of yards of wire required to fence a field; number of square feet in a table or floor; how many yards of carpeting would be required to carpet a floor, the dimensions of the floor being given; how much wall paper is needed to paper a room, and to the girls teach such problems as they will meet in going to stores with pottery or vegetables, which they will exchange for calico, groceries, etc.

Below are given a few examples to show the practical elements that should be embodied in this work.

Examples:

How many yards of fence will it take to inclose a field that is 30 yards on one side, 25 yards on another side, 40 yards on another, and 45 yards on the remaining side?

Draw a square 4 inches on a side. How many square inches does the square contain?

A table is 3 feet long and 2 feet wide. How many square feet in the table?

Measure table in schoolroom. How many square feet?

Measure the schoolroom floor. How many square feet in the floor?

Suppose the floor is 6 feet one way and 12 feet the other way; how many square feet in the floor?

How many yards of carpeting will it require if the carpeting is 1 yard wide?

How wide is a house which has a room 20 feet wide and the two outer walls are each 1 foot thick?

The room in this house is 25 feet long and 10 feet high. How many square feet on each side?

Wall paper being 20 inches wide, how much paper is required to paper the room?

Juanna goes to the store with 8 tenahas to sell, for which she asks 10 cents apiece; how much does she get for them? The trader says he can not pay her in money, but will pay her in calico, at 5 cents a yard. How many yards does she receive?

Maria takes 10 pounds of wheat to the store, for which she asks 2½ cents a pound. The trader pays her in coffee, at 10 cents a pound; how many pounds does he give her?

Manuella sells 6 pounds of meat to one man, 4 pounds to another man, and 8 pounds to another. How many pounds does she sell? She asks 3 cents a pound for the meat; how much money does she receive? With this money she buys sugar worth 9 cents a pound; how many pounds does she receive?

**Summary.**

*First year.*—Pupils taught to count and write numbers to 50.

To add and subtract numbers to 10, which, in addition, comprises the combinations above the line passing diagonally through the 45.
Roman notation as far as X.
Indefinite comparison.

Second year.—Count and write numbers to 1,000.
The 45 combinations and subtraction of the numbers.
Denominate numbers; something of liquid and dry measures and
linear measure, using actual measures; measure the pupils.
Indefinite comparison continued.
Roman notation to XXV.

Third year.—Notation and numeration to 10,000.
Frequent review of the 45 combinations, and "constant addition"
carried through 6.
Writing halves, thirds, etc., to fifths.
Roman notation to L.
Definite comparison, or ratio, with lines and surfaces.

Fourth year.—Notation and numeration to millions.
Constant addition carried through 9.
Addition and subtraction of numbers of two periods, and give
examples using terms drawn from the child's home experience.
Time and table of time; avoirdupois weight, using scales and
weights.
Fractions to eighths and ninths. Roman notation to C.

Fifth year.—Multiplication and division and tables for both.
Reduction, addition, and subtraction of fractions having denomina-
tors not greater than 9.
Review denominate numbers, using actual measures.
Drill in the 45 combinations.
Practice adding columns of figures.

Sixth year.—Multiplication and division of fractions.
Decimal fractions.
Accounts and bills.
Interest, simple practical problems.
The Bakery.

This important department of the school is established to supply the school table with wholesome, appetizing bread, and to teach the pupils how to make bread of all kinds for family use.

No girl should be allowed to leave school until she understands the art thoroughly; indeed, instruction must be given the children at such an early age that they cannot fail to learn bread making early in the school life and have several years in school to practice this invaluable accomplishment, assisting in teaching the art to the younger pupils, and becoming so accustomed to it as to be content only when good bread is set before them.

It is highly important that a number of boys be taught the baker's trade, since boys frequently like the work and become excellent bakers, and secure lucrative positions; but it is imperative that every girl be taught to make bread.

Pupils must wear proper clothing in the bakery, of washable material and scrupulously clean. Special attention must be given to washing the hands thoroughly and cleaning the nails, since particles of dirt
collect under the nails and unless cleaned out quite thoroughly will work out into the bread. It is always best to wear a cap on the head.

A few talks on the different grades of wheat, the properties of flour made from winter and from spring wheat; the fact that wheat is the most important cereal; making of yeast and its influence; setting sponge; mixing the dough; molding loaves, biscuits, rolls, etc.; baking the bread and the treatment of the loaves when taken from the oven; making different kinds of bread—rye, graham, brown, and corn bread—and the making and baking of pies, cookies, and cakes; the making and frying of crullers and doughnuts.

The care of the fire and oven is an important lesson that must be impressed; also the care of bread pans, sacks, boards, and boxes. Every girl must be taught how to cut bread into dainty, thin slices and place on plates in a neat, attractive manner.

Pupils must know that wheat has the largest proportion of nitrogenous principle of any of the grains used in making bread; that it is the most satisfying nutriment; that there are many ways of making bread, and that different kinds give a pleasing variety, but for daily use the most satisfactory loaf is made with flour, water, salt, and yeast.

The loaves should be of such form that the heat will readily penetrate to the center and cook the starch thoroughly. The more dough is kneaded the finer and closer grained the loaf.

The pupil must learn expedition, which means a wise collection and preparation of materials and everything put to its proper use.

Pupils who desire to become bakers can receive complete instruction at some of the large nonreservation schools, including the management of a bakery, estimates for supplies, observation of the fluctuation of the grain markets, chemistry, and business methods.
BASKETRY AND CANING.

BASKETRY.

To Agents and Superintendents:

It is desired by the Indian Bureau that basketry be taught in the Indian schools. Will you please furnish this office with the names of basket makers on your reservation, sending specimens of the work they can do, and giving all information concerning them that may be of interest and use in the furtherance of this project? In this way it will be possible to know where to find teachers for the different kinds of basketry wrought by Indians throughout the United States.

Indian basket makers are desired as teachers who have skill and ability and who use the old methods of coloring with the beautiful and lasting natural dyes, also those who understand weaving into their baskets the designs which symbolize the history and traditions of their tribe, making them distinctively Indian. The basketry as woven by Indians for generations past is fast becoming a lost art and must be revived by the children of the present generation, that they may take their rightful place among the leading basket makers of the world and supply the demands of the markets for such baskets.

Very respectfully,

Estelle Reel,
Superintendent of Indian Schools.

The Indian’s great finger skill shows the wisdom of training him in what demands finger skill. In the education of Indian boys and girls the work that the various tribes have been noted for doing especially well must be considered and training given the children that will enable them to continue the work begun long ago, and so skillfully executed by their ancestors. If the tribe is one of blanket weavers, it is advised that the services of the best weaver of the tribe be engaged and instruction given regularly in the art, that the pupils may become skillful in doing the work and thus be able to place upon the markets the beautiful blankets that have made their tribe famous and which are always in demand.

Among the tribes of potters it will be easy to find an expert man or woman who can be engaged to come to the school at stated times and instruct the children in the manufacture of pottery. Modern designs,
suggested by the modern articles on sale at the agency stores, cheapen the wares of the Indian, and his individuality does not assert itself as it should and as it does in all the work of the old Indians of generations past. The importance of preserving the Indian designs and shapes can not be overestimated. The object must be to weave the history and traditions of the tribe in all distinctively Indian work, thus making it historical, typical, and of value. The nations of the world preserve their individuality in their work. The Chinese do not attempt to imitate the work of other nations, nor should the Indians. Race pride should stimulate them to effort in preserving the work of the past. Indian work is always in demand, but is difficult to obtain, since the tendency of the tribes is to copy from modern wares, and the work is not distinctively Indian. A good living is in the hands of those who will faithfully portray the work of their ancestors. In this, as in everything else in life, the best takes first place.

In like manner the bead work which some of the tribes excel in doing should be encouraged and taught the children. Soft, well-made
moccasins and other articles of Indian manufacture will always find sale if there are workers who will make them of distinctively Indian design.

Correspondence is invited with this office from agents and superintendents representing the blanket weaving, potter, and basket-weaving classes of Indians, recommending native teachers in these arts. It is desired that the tribes that make especially good pottery, weaving, or basketry teach the children of the tribe the art, and equip them with the ability to put on the market as useful, durable, and beautiful articles as could their ancestors.

The Indian students who have attended the nonreservation schools know the needs of the markets in many places and are the ones to show their people how much they may contribute to the world of workers in giving their work in a larger way. Of all Indian work, however, basketry must take the lead, since the demand for this article is great everywhere. In every school where the children are descendants of a basket-making tribe and where suitable materials are obtainable a good teacher of basketry should be employed, and all the children must learn the art, since very many skilled workers are necessary to supply the demands of the times for these baskets.

In museums and in private collections are to be seen Indian baskets of wonderful weave and beauty. The feather baskets of the North-west, in which are woven in the most durable manner the feathers of the woodpecker, meadow lark, and other birds; the strong decorative baskets of the South; and many other singularly beautiful and useful baskets, are difficult to obtain now, owing to the fact that few Indians are living who know how to make them. The baskets made of the stems of ferns by the California Indians are durable beyond many that are sold in our large cities to-day from the markets of Europe and the Orient. Many other baskets made by Indians in different parts of the United States might be mentioned, which, if put into stores, would attract and surprise purchasers by their beauty and durability. The schools will be able to secure the services of the Indians on the reserve to supply them with material (which grows abundantly in many places) for the manufacture of baskets as woven by the special teacher then employed. It is so necessary that the children be taught how to make and use the vegetable coloring that Indians have used in the past for ornamenting the baskets that the caution against using aniline dyes is repeated, since they fade and "run" and detract from the value of the baskets.

In such schools in New York City as the Teachers' College, Columbia University, the Ethical Culture Schools, Pratt Institute, and also in many schools in other cities, basketry is taught all children from the earliest grades to the normal schools. Teachers pay large prices
for lessons in basketry. We find it necessary and beneficial to give
basketry to Anglo-Saxon children, and how much more desirable is it
for children who come from a race of basket makers and who possess
the finger skill to turn out beautiful work of this kind.

The French peasants supply our markets with braids for making
hats. Why should not our Indians do this and make other greatly
needed articles in straw?

With the returned student as the connecting link between the Indian
at home and the needs of the world, the Indians as a people must be
led to see the importance of developing the work they are so gifted
in doing, and to help supply the market's demands; and thus take a
long step in the direction of self-support; which, after all, is the end
of all Indian education.

Recognizing the ability and skill of the Indian as a basket maker,
it is desired to teach the children of the basket-making tribes (in their
respective schools) the basketry their ancestors wove. Indian basketry
must not become a lost art, and it rests with the children of the pres-
ent generation to acquire skill in doing the beautiful work accom-
plished by Indians in the past.

The Indian teacher of the various arts, when directed by the intelli-
gent white teacher, will become a factor for great good, inspiring
the children with a love for the work of their forefathers, and the
white teacher will add to this good effect by showing them that their
work is appreciated and needed, and by sympathetic suggestions as
the occasion arises.

She must constantly impress them with the beauty of symbolic
designs and vegetable coloring as used by the Indians originally. The
children must be led to see how important it is for them to learn
the arts of making baskets as they were woven by their parents, since
but few old Indians are living who can impart this valuable instruc-
tion, and to allow these arts to become extinct is the greatest mistake
the Indian of to-day could possibly make. The demand for baskets
was never greater than now. Thousands are imported yearly. Our
own Indians should be the producers and the beneficiaries in supplying
the demands for baskets. They are able to make quite as durable and
fully as artistic a basket, from an aesthetic standpoint, as any of the
foreign races to whom we send for baskets. The work is peculiarly
agreeable to Indians, and the revenue arising from this industry would
be important. The pride of the Indian must be aroused in this par-
ticular branch of industry, the Indians being the native American
basket makers.

Originating new shapes and faithfully reproducing the patterns
made by their ancestors will be an important part of the instruction
in basketry.
At each school the superintendent will be expected to see that his farmer shall confer with the Indian basket makers of the tribe, thoroughly familiarizing himself with the materials that are used for making baskets in their respective localities, and the kind of soil in which the materials grow. He must plant and raise a sufficient amount of such material for the use of the pupils that they may have sufficient to make baskets throughout the year. This idea is well set forth by Dr. George Wharton James in his work on Indian Basketry.

**FIRST YEAR.**

Lessons in basketry may be helpfully given the children the first year in school. The teacher will find willows, reeds, cat-tails, or some tough, flexible growth near the school which can be utilized in weaving baskets. Use the material damp, always. Mats may be woven for the tables and floors, small baskets woven, doll furniture made, and also many other things. Varied Occupations in Weaving, by Louise Walker, gives a number of suggestions for weaving with a variety of materials.

While the child’s hand and eye are being trained to accuracy and his observing faculties aroused, a desire to create is stimulated, and work and play are closely interwoven.

Raphia is well adapted to use in the class room. This is a grass which grows in Madagascar, and which may be braided and used in a number of ways in the first and second years’ lessons in basketry. In many places native grasses can be found that can be handled as easily and will answer the purpose of raphia for braiding. With needle and thread the braided raphia, or whatever grass is used, can easily be sewn into baskets of all shapes and also into doll furniture. Hats for dolls and children may be made of it, and many useful and ornamental baskets taught and woven in the lessons the first year, or kindergarten period. Even hay makes beautiful baskets. The finger skill which the child acquires from work of this kind not only lays a valuable foundation for basketry, but trains the faculties in many ways.

Cane Basket Work, by Annie Firth, London, contains a number of excellent illustrations, showing the work step by step, and the teacher who has not had the advantage of lessons in basketry will, by carefully studying the illustrations and the printed directions accompanying each, be enabled to weave baskets. She will therefore be able to teach the principles of weaving in the small classes and be well prepared to master the art as presented by the practical basket maker when the opportunity to learn basketry is presented.

In using native grasses for baskets (soft grasses that might take the place of raphia) wire spokes may be used, and they form a durable foundation for the “weaver” to pass around.

How to Make Baskets, by Miss White, also contains many helpful ideas.
SECOND YEAR.

The second year's work will be a continuation and extension of the work outlined for the first year. The children will be able to do more accurate work, make better and stronger doll furniture, good mats for the floor, put seats in old chairs that have good frames and need only caning.

Willows, cat claws, cat-tails, rushes, yucca, agave, the shredded bark and roots of various trees, and the tough stems of shrubs and plants can all be used. The school and agency farmers will be expected to plant and raise such grasses and materials as are suited to local conditions and needed in making baskets. Baskets of surpassing beauty and great wear are made from so many materials that "almost anything that grows," as a practical basket maker once remarked, may be happily utilized.

Work in cane, making bottoms and backs for chairs, is excellent in connection with basketry and is another good way to develop finger skill. This will also be given in the class room and the child prepared for the instruction to be given by the practical basket maker.

THIRD YEAR.

At the schools located among the tribes of basket-making Indians, the native basket maker will teach the children basketry, thus perpetuating the art and endeavoring to show the children of a race whose ancestors have excelled in making baskets that they possess the ability and can acquire the skill to make baskets of great value. Some schools may find it difficult to secure a native basket maker, since but few are left, and where several schools are adjacent, one teacher can easily teach at all. She must have regular days and stated times for remaining at each school. Teachers in the East have to pay large sums for lessons in basketry, and the Indian school-teachers can readily see what an opportunity this will be for them to acquire the art of making baskets. When the office can secure the services of old Indians who are typical native basket makers, the instruction will be thoroughly imparted and the pupils given every opportunity to learn this important work.

CANING.

THIRD YEAR.

Practical basket makers begin with square mats. The teacher will find that by having squares of cardboard or pasteboard prepared with holes punched around the edges, thus,
the child will have a substantial foundation upon which to learn to weave cane. The accompanying illustrations will show how the cane may be stretched from side to side.

This is the first lesson. The next will be with a frame of wood, which the boys can prepare in the class room, with holes in the edges. The cane must be used damp, not wet. It is not easily spoiled by moist or soiled hands, can be easily threaded and drawn firmly by the child. With such substantial frames many patterns of beauty and use may be woven. These seats must be kept, and with a little instruction from the carpenter the boys can easily make little chairs for use in the kindergarten or first-grade class rooms, and the school will not have to call upon the office for little chairs, as has been so extensively done.

In preparing pasteboard mats for the cane to be strung through at first to give the children an idea of the work, the board must be very firm and strong. The holes should be far apart and an open pattern made, which is easiest for the child to handle at first. Cross weaving may also be taught. This gradually leads up to chair caning.

The chair pattern is very easy. The rows are stretched (damp cane) as shown in illustration, fixed in order as numbered—two rows at right angles, then two rows interwoven diagonally with the first two. Leave the ends of the diagonal rows loose and just long enough to come to the edge. When the four rows are put in, the rush is laced around the edges as shown. Let the rush and the cane used to lace with be just damp, not in the least wet. In fixing the stretched
strands it is never necessary to tie the cane twice, for a knot once tied and flattened with the thumb will keep firm and flat.

Most of the cane chairs on the market are in this pattern. It is one that wears well. The diagonal rows are put in last. The lacing row, as the fourth is called, need not be pushed down the side holes, these ends and those of the diagonals and the edges being covered with the

![Fig. 4.](image)

rush. If we weave the mat needle at first we see the path for the cane, but the fingers must thread it, any stiff strand being lifted with a pin to allow the weaving thread to go under it.¹

Knowing these patterns, the children can cane all chairs in the school neatly and in a durable manner.

¹ The Primary School, November, 1900.
BLACKSMITHING.

It is intended that all the boys in school shall receive some instruction in blacksmithing, sufficient, at least, to enable each to shoe a horse well, to set a tire on a wheel, to make the various pieces of ironwork that can be made by a blacksmith, and to be generally capable of repairing his implements of farming, dairying, etc., and in making the less complicated ones, so as to enable him to become more successful in his farm work.

Boys about 12 or 13, who possess sufficient strength and robust health, may begin this work, and the instruction should continue from two to three years, according to the progress made by the student.

FIRST YEAR.

The first thing for the blacksmith to look to is the arrangement of his shop. He should so order it as to give instruction to the desired number of boys with the least possible apparatus. All the forges should, if possible, be in the middle of the shop, both to promote convenience and as a safeguard against fire, but the boys should also be shown how to construct forges against the side of the room, as in small shops this kind may be more desirable as economizing space. Each forge must have a rack for tools close at hand.

Give instruction as to the proper construction of forges and the care of fires. Teach how to make a good fire and how to concentrate it and keep it from spreading by sprinkling with water and packing the coal down firmly.

There will, of course, be an anvil for every forge. It should not be placed too near the forge, for that causes inconvenience; about 6 feet from the center of the fire is the proper distance. The timber on which the anvil is placed should be set well into the ground, and its top should not be much larger than the base of the anvil. The height of the anvil should be such that when the user stands upright his knuckles will rest upon its top. In setting up the anvil, as well as in the other preparations, utilize the aid of the boys as much as possible. Workmanship and neatness should be insisted upon.

Place the vises also in systematic order, as, for example, in a row, say, 6 feet apart. Have a drawer under each vise for the files, hammers, and other necessary tools. Likewise have a place for the horseshoeing tools. The intelligent blacksmith will be able to carry out this
idea in respect to all his apparatus, and he will thus set a good example to his pupils and inculcate habits of order and proper care of tools.

The shop being thus correctly arranged, the first thing to do is to teach the boys the names of the tools and their several uses. Drill each boy in their locations until he can lay his hand readily upon any tool desired. Insist upon the tools being returned to their places when not in use, and being kept in proper condition.

The following will be given this year:

- Drawing square iron to a point, to flat, to bevel, and to round;
- Drawing from round to square, to octagon, and from octagon again to round;
- Bending rings of round and flat iron; pointing and bending a staple;
- Drawing, bending, and twisting in making a hook; upsetting and forming square and hexagon head bolts; punching and cutting square and hexagon nuts; bending, twisting, and punching flat iron;
- Upsetting, drawing, bending, punching, and chamfering square angle piece.

A corner in the blacksmith shop.

The next instruction will be to teach the pupils how to weld two pieces of iron together, how to get the proper heat, and how to treat the iron with borax and sand to prevent burning, etc. Sand will usually be found sufficient, but where the iron is liable to burn or scale off, borax will be necessary. It will probably be found best to keep the boys at the forge with the instructor until each can do a little work himself, and then they may be put at forges by themselves. Two or three boys can be assigned to each forge if necessary. Before they begin any work themselves, however, show them the proper way of wielding the hammer; that the arm should swing free from the body and the stroke be long and deliberate, instead of short and jerky.

As soon as he learns how to weld, the boy will be able to make simple implements, and this kind of work should be given him. If possible, set him the task of making something which he can use in his
other work, as for example, in the garden, that he may feel a pride in doing it well, and thus have his enthusiasm for the work aroused. It will be found that the boy can successfully make many things of this kind that will be needed around the school. Also many of the simpler tools that he will need later on in his blacksmith work can be made now. As soon as the pupils have acquired some skill in the handling of their tools and in working the iron, they may be set to practicing, fixing up and reshaping old shoes, the blacksmith always examining their work and endeavoring to assist them in improving it.

Have the boys forge and make out of old iron some small bolts, gate hooks, hasps, and similar things. Train them in habits of thrift and economy by making all old iron into useful articles.

If a boy should break any of the tools he uses in his work in farming and gardening, let him repair them himself, assisting him if necessary.

Give such other work in repairing as the circumstances will permit.

As suggested in the course of engineering, it is likewise recommended here that the instructor set apart an hour each week for a general cleaning up and setting the shop to rights and an inspection by the instructor immediately after. It would be well after the inspection to give a little talk to the boys, commending what is meritorious and shows enterprise and industry, and pointing out those things in which improvement might be made.

SECOND YEAR.

Study horseshoeing as to the following points:

1. Stripping and preparing foot to receive new shoe and nailing it in place.
2. Reshaping old and making new shoes to overcome difficulties with the feet.
3. Study of diseases of the foot and remedies available through good shoeing.
4. Shoeing to overcome difficulties in gait, as interfering, knee knocking, stumbling, etc.
5. Different kinds of shoes for the different seasons, and with respect to the character of the employment of the horse.

Begin the instruction by having the boys watch repeatedly the work of shoeing the horses, and explain to them at the same time each step as it is taken in preparing the hoof and putting on the shoe. Then take a gentle horse, and after preparing the hoof and fitting the shoe and tacking it in place, give the boy the hammer and show him how to take the nail in his fingers and start and drive it, and then to cut and clinch the nail and rasp and finish the foot. Rasp ing the hoof, however, should be done as sparingly as possible and very carefully. It will take a great deal of experience to do this work correctly, especially the nailing, and the boy must be made to do it many times under the eye of the instructor.

To be able to shoe a horse well and intelligently it is necessary for the boy to understand the nature of the horse’s foot. In order to do
COURSE OF STUDY FOR INDIAN SCHOOLS.

this, it is desirable to have a hoof to examine. The blacksmith should endeavor to obtain the leg of a horse from the kneejoint down. Place the severed limb in hot lime for several weeks, and then clean thoroughly, and by boring small holes in the bones of the fetlock and running through a small copper wire, fasten them together so that they will be nearly as pliable as in life. This will be of the greatest value to give the pupils a correct idea of the construction and working of the hoof and the leg. When this specimen hoof is placed on the floor, and the long bone is held in its normal upright position, it should square up with a try-square placed beside it. If it leans to the front, the heel of the shoe is too high, and this is, as the instructor should explain to the boys, a frequent cause of spring knee. If it inclines to the back, the toe is too high. Thus the boy will learn how to know the proper height for the heel and toe, respectively, of any particular animal.

It would be very well also to make an effort to get abnormal legs and hoofs and prepare them in this way for the instruction of the learners; also hoofs that have been cracked or otherwise injured by poor workmanship in shoeing; diseased hoofs, etc. The more of these specimens the instructor can obtain, the better.

A shoe should never be used hot, for the veins of the foot are not deep, and to do so is injurious to the horse.

Some instruction in wheelwrighting must be given in connection with blacksmithing, in order to make available the boy’s skill in the blacksmith’s art. To this end, some work in wood will be necessary. The work in carpentry will have given the boy some skill in this line, but considerable further training will be required to adapt it to the woodwork required in connection with blacksmithing.

Review and elaborate instruction in welding—butt, lap, and split welding, and the cases in which each should be employed.

Every boy will be expected to make for himself before the year is out as complete a set of horseshoeing tools as possible. Make him keep a record of his tools and keep them in their proper places in a tool rack or box, which he will also construct for himself. He must also make his other blacksmithing tools, and keep well-sharpened those that require it.

Instruct the pupils in the making of such farming implements as a blacksmith can ordinarily make. In order to do this completely, he must have practice in the making of handles for such tools, which the instructor will see to. Many of the boys may, from their work in the garden, be able to devise new tools for use in cultivation which will lessen or make more valuable their labor, and this tendency should be fostered, and they should be encouraged to put their ideas into practice.

Teach carefully the setting of tires. It will take some little time for the pupils to master this so as to gauge the shrinkage so that the wheel will get just the right “dish” and no more.
Give some instruction in the different kinds of fuel, compare their values, and show for what purposes each is better adapted. By this time the pupils ought to be fairly skillful in their work and can be given the general repairing of the school. Plows, harrows, cultivators, mowers, etc., will last indefinitely if repaired promptly; and instead of ordering new ones, the old ones should be mended, thus teaching a valuable lesson in good husbandry. Be careful to see that these machines and implements are kept under roof and well painted.

Give instruction and practice in making chains, both light and heavy. An important thing to be insisted upon is that the links be kept uniform in size, and none of the links slighted, for the pupils must remember that the chain can be no stronger than its weakest link.

Save all old bolts and make them into spikes and hooks for the hanging of harness and other articles.

Teach the casehardening of iron and the hardening and tempering of steel. Show how the degree of hardness is evidenced by the color of the steel when going through the process. It is important and necessary to know how hard the steel should be for various tools and how the degree of hardness may be known by the color of the steel. This is a process requiring very close attention.

Many of the wooden parts of a wagon must now be made, among them the felly for a wheel, bolsters, wooden axles, tongues, thills, and wagon boxes and seats. Have the boys make a complete wagon box for a farm wagon, including seat and sideboards for increasing its capacity. All the iron work, including the bolts, must be made in the shop by the pupils.

Give instruction and practice in making horseshoes out of old iron as well as from horseshoe iron. Show the difference between shoes for
farm work and those for heavy road work, and between those for winter and those for summer, and the reasons for the same.

Give talks on materials, their sources and prices. Assign problems to the students, such as the computation of the cost of a certain job of blacksmithing, the materials and their prices being given. Give others, in which they shall ascertain the cost of setting up a small shop suitable for a farmer’s use. These exercises will develop and train the student’s thinking and creative powers and should be indulged in frequently. The work of the class will afford numberless questions of this kind, and the intelligent blacksmith will have no difficulty in finding problems.

The following should be taught the pupils this year in addition to and elaboration of what has already been laid down:

Upsetting; welding; forming; punching; introducing casehardening in making heading tools; drawing and upsetting nails and rivets in heading tool; butt welding; bending and welding in making chain; forming, punching, slotting, and bending a hasp; laying off and forming diagonal brace; forging eccentric strap; drawing out, bending, and threading eyebolt with ring; T welding; jump-welding steel; forging S wrench.

THIRD YEAR.

Review and continue the work of the preceding year on the subject of horseshoeing. Much and continual practice must be given to this work, as it is the most important single part of the course in blacksmithing and requires much study and skill. Give frequent talks on the subject of horseshoeing, and on blacksmithing in general. Show the proper manner of treating cases of interfering and knee knocking; how the condition of a horse with knee spring may be ameliorated by the use of shoes with the heels projecting out backward beyond the hoof. Explain the best way of shoeing horses with brittle hoofs and the use of the toe clip in cases of this kind. Likewise illustrate the treatment and shoeing of horses having cracked hoofs.

Impress upon the boys the intensity of the suffering inflicted upon the animal by poor shoeing, and also how this lessens his value and working powers. Shoes must not be put on in such a manner as to be liable to expand or contract, thus crushing or expanding the hoof.

In fastening the shoe, small nails driven low are the best. Large nails are likely to lacerate and break the hoof, and those driven too high are liable to penetrate the sensitive parts and become painful to the animal, if nothing worse results. The holes also take too long to grow out when the nails are driven high.

The shoe must be made to fit the hoof and not the hoof to fit the shoe. The more perfect the fit, the more comfortable will be the horse, and consequently the more work he can do. The practice so
generally indulged in of applying the red-hot shoe to the hoof and burning the hoof to the shape of the shoe should be discountenanced. The shoe should fit the hoof as squarely as possible at all points, otherwise it is improperly made. It should neither project beyond the edge of the hoof nor recede from it. When the shoe is put on the work is, or ought to be, complete, and little rasping of the hoof to shape it to the form of the shoe should be necessary, for by this practice the natural and necessary coating of the hoof is destroyed and the foot injured.

Wherever practicable, teach also the shoeing of oxen and mules. If there are none available, at least show the boys the manner in which the shoeing should be done and how it may differ from horseshoeing. The mule is often a very valuable animal to the Indians, and an effort should be made to familiarize each boy with the shoeing of mules. The same will apply to the shoeing of oxen in localities where these animals may be used.

The work in wagon making and repairing will be very important in this year's work. The pupils should now be skillful enough to make almost all of the iron parts required for a farm wagon. Continue the work in the setting of tires. When a tire is taken off a wheel, it should be carefully marked with a file or by other means, so that when it is put back it can be replaced in exactly the position in which it was found. This is essential in order to make the tire fit well and render the shrinkage really effective. If the tire is put on in a different position from that which it occupied before being removed, it is liable to loosen as soon as it "fits" or adapts itself to its new position on the felly, and thus the object is defeated. Show by the actual work how
much "draw" should be taken in the tires of different wheels, how
the tire should be heated and shortened, and finally how it should be
put on again.

In like manner illustrate how to remedy the defect in a wheel of a
back dish.

Much practice must be given in making the various wooden parts
of a wagon, commencing with the spokes and fellies for the wheels.
Before the close of the year it is desired that the class make a com-
plete light farm wagon. This will be work of the most valuable and
practical kind, and will teach the pupils more about the construction
and repair of vehicles than can be obtained by any other means.

The pupils will also make and iron completely wheelbarrows and
other useful articles.

In northern sections sleds will also be constructed and all the iron
and wood work made by the pupils. The making and repairing of
sled shoes will be somewhat difficult and will require special attention
on the part of the instructor.

Sledges for use on dry ground, which are so essential to the farmer
for innumerable purposes, such as moving very heavy articles from
place to place, and especially over soft and cultivated ground, and
transporting others for short distances over difficult places, will be
made by the students under the direction of the blacksmith. These
will be shod by the use of broad wooden shoes, made from hickory
or other tough, smooth material.

Instruction will be given in the repair of plows. Study the con-
struction of a plow and the relations and uses of the several parts and
how to put them together. Show how to sharpen a plowpoint which
has been worn down and how to harden it, and how to make and
repair such parts of a plow as can be made or repaired by an ordinary
blacksmith. Illustrate how defects and faults in plows may be reme-
died; how to correct the tendency to "flop" and run unsteadily or to
run too deeply or too near the surface.

Give instruction in the hardening and softening of metals. Springs
may be hardened by heating to a low red heat and then plunging into
a bath of lukewarm water. Hammers and other tools should be hard-
ened by heating to a similar degree of heat and cooling in cold water.
Steel may be softened by heating and then permitted to cool as slowly
as possible by covering with cinders and ashes.

Give instruction in drilling holes in iron; how to drill in steel and
other very hard iron.

The boys should now be skillful enough to make or repair almost
any farm-implement that can be made by a blacksmith, and at every
opportunity practice in work of this kind should be given them.
Accustom them to making old iron and cast-off scraps of use in the
construction or repair of useful articles.
The bellows or blower is one of the most important things to a blacksmith. Every boy must be shown the construction of a bellows and taught how to make one for himself, so that when he establishes his own little shop in connection with his farm or otherwise he will not be handicapped or defeated in his purpose by the want of a satisfactory bellows, which is a primary requisite to any blacksmith work. Caution the students against having a bellows too small. A large one is but little more difficult to make and does much more satisfactory work. A 1½ or 2 inch exhaust is the best. The bellows should be hung up near the ceiling to be out of the way.

The following should be taught the pupils this year in addition to and elaboration of what has already been laid down:

Drawing cast steel and introducing tempering in making cold chisel; forging and tempering flat drill; forging and tempering hammer; drawing, bending, punching, and tempering arch spring; forging and tempering lathe tools; welding steel to iron; forging blacksmith tongs and other tools; a study of the reading of drawings; the construction of iron, steel, etc.; the study of fuels and their combustion; the study of tools, their names, uses, and parts.

After this three years' course any boy of ordinary ability should be able to do practically all the work required of the average blacksmith, and during the third year the students should be given charge of some of the boys just beginning the work. This will be of much benefit to the advanced pupils, will test their knowledge of and skill in the work, and will also relieve the instructor of much work and enable him to carry on the instruction in a more satisfactory manner.

If any of the pupils show special taste and adaptability for the trade of blacksmithing and desire to follow it as an occupation, they should be sent to a nonreservation school having special facilities for instruction in this work, where the student will receive further training to fit him to become an expert blacksmith.

The directions here given have necessarily been brief and the working out of the many details is confidently left to the teacher in blacksmithing. It is desired that he impart to the students all the instruction, and give all the practice here directed, and as much in addition as his judgment approves and his facilities and time will permit.

The idea that the instructor should keep before him in his work is that he is endeavoring to fit the boy, not so much for the trade of a blacksmith, as for doing his own blacksmith work when he has settled down on his farm, dairy, or ranch, and the things he is likely to have to do when that time arrives are the things of prime importance to be taught.
CARPENTRY.

FIRST STEPS IN WOODWORK.

Many people miss their calling in life because they do not know their talents. In schools where pupils are nourished with theoretical training only, they have few opportunities to show their ability for invention or creation. The active side of their natures (that, for the most part, upon which the choice of a calling depends), is rarely noticed in such a school, and, for want of exercise, is not likely to make its appearance. In schools of this character, only a part of a human being is trained. The greatest men have become what they are by independent labor. By industrial instruction will it be possible to become acquainted with the talents and powers of the pupil. Labor will make the pupil himself conscious of his capabilities. Child nature implies action rather than meditation. Industrial education is simply an extension of Froebel’s idea.

Comenius said: “The human body needs movement and occupation.” Children should be instructed to make their own playthings. This will accustom them to look to themselves and to their own efforts for help in their emergencies.

Rousseau says: “If I employ a child in the workshop instead of chaining him to a book, then his hands will work to the benefit of his mind.”

Pestalozzi admitted into his school the turning lathe, joiner’s bench, sewing, etc., saying that he saw, every day, how “industry trains the understanding and gives force to all the feelings of the heart.” Hand labor is a foundation stone and guide to morality. We can not afford to develop the speculative side of a child and neglect the side that wills and acts. Many educators acknowledge that “it is better for a child to be able to construct a sphere out of wood than to merely understand the definition of a sphere.”

It is desired to evolve a course of manual training conforming to the child’s interests and which will stimulate the habit of work. It is the greatest unwisdom to train the mind alone. A knowledge of how to do many things is of more value than merely brain power, and mental discipline is sure to follow a certain amount of doing with the hands. A mental stimulus follows the making of a good table. The mind may not become morbid when the hands are used, and a healthier brain is the result.
Manual training embraces anything taught that trains the mind and hand together; whether it be at the bench in the carpenter shop, at the desk with knife and lumber, in the sewing room, the kitchen, laundry, or in any department where pupils are "learning by doing."

Do not think it is impossible to do good work in wood because the school does not happen to be equipped with a lot of tools and especially constructed benches. These are not essential. With some lumber, a few planes and saws, a hammer, try-square, paper and pencils, you can make your own benches and many other things you need; thus teaching the pupils, at the very beginning, a lesson in self-reliance, and enabling them to gain power from the start. Before beginning to make the benches, draw the design on paper, thus showing them the importance of planning and originating, intelligently and systematically.

A good vise can also be made by the boys with very crude material and with but little labor. Likewise the boys will be able to make in the blacksmith shop many useful things for the carpenter work, and their ingenuity in this direction should be encouraged.

With a little determination, energy, and enthusiasm, the teacher will soon find himself (or herself) equipped to go ahead with the work effectively and successfully; and in the very work of preparation the pupils will have been given the most valuable lesson of the course.

Shape the work to fit the tools and materials at hand. If the most desirable lumber is not obtainable, use the kind you have. The child when grown up will, more frequently than otherwise, find himself in a position where he has very little with which to work, and it is well to train him now to meet such difficulties. The instructor should constantly keep in mind that his object and aim is to fit his pupils to meet and overcome the conditions that will most probably surround them when they leave school and enter life in real earnest. If he keeps this purpose constantly before him, there is little danger that he will deviate from the practical in Indian education, or that he will fail to succeed in his work.

In schools of all nationalities many children do their best to grasp theoretical studies, yet fail; and pupils frequently answer questions correctly, when a lesson is not comprehended. This is especially true of Indian children, whose answers are more frequently confined to monosyllables, and whose ability to express themselves in the English language is limited.

In life men must put their ideas into execution, and in the classroom the real value of the instruction is evidenced in the pupil's ability to do rather than to merely say. A German educator wisely wrote: "Why should we occupy the child's mind with subjects which are of no real importance to him and upon which his attention remains only as long as the love of the teacher or fear of punishment holds him?"
Purely memory lessons are of little value, but experience gives interest to study.

The work in wood must sustain the interest of the child, counteract the evil of sitting still, and cultivate the habit of attention. The work must lead from the easy to the difficult, so that in each lesson given the child will be prepared for the work in the next. The models must be such as can be used. Useless and fancy models may be pleasing to the eye, but are apt to mislead the child, who may look upon the practical carpentry work as crude in comparison. The real value of the instruction is evidenced in the pupils' ability to make something. The work given must train to habits of neatness, order, and cleanliness, and it must emphasize the dignity of labor.

As the teacher is, so are the pupils. An enthusiastic teacher, even with a limited outfit, can accomplish much. Keep in view the material and tools the child will have to use at home, then train him to work with a similar outfit at school. If one will observe children at play, how they haul wood in their little wagons, build houses, play housekeeping in their games, how earnestly they work, it will help teachers to plan work in the schoolroom which will give them the mental and physical activity they need.

Elaborate outfits for each boy are not necessary nor desirable. The tools he will have after leaving school will most probably be few, perhaps crude, and his material not always of the best, so we must teach the boy to work with such as he is likely to have. Develop his ingenuity and endeavor to make him self-reliant and inventive. A few chisels, a hammer or two, some planes, and a few other simple tools will answer at first.

Give a number of small boys into the care of a large pupil who has been through the course of instruction; lay out a systematic course of exercises for him to give the boys under his charge, beginning with drawings and reproductions of the drawings in wood. Oversee his work and that of the boys under him, and in this way give the small boys the necessary preparation to become skilled workmen, and very little time will have to be taken from the regular work in hand to have a class of boys ready to become real helpers to the carpenter.

First Year.

In every department the technical training goes hand in hand with the practical experience.

In this most important branch the class-room teacher begins with the child the first year in school with free-hand cutting, letting the children cut everything introduced in the lesson of the day. Should the subject of the lesson be the horse, the children will cut out of paper a horse, his stable, the pail he drinks from, or his trough, his blanket, currycomb, basket containing feed, etc. If the dining room is the
Lesson, then the children will furnish the room with paper tables, chairs, dishes, knives, forks, spoons, children, and whatever else they may consider needed in such a room.

In similar lessons, barns, houses, and dolls will be cut. The doll house will be furnished complete with paper furniture.

Modeling in clay must be another expression of the work in manual training. The furniture and other accessories of the home will be done in clay. This leads up to working in wood in a simple way.

The teacher will have ready thin strips of wood. Any thin boxes can be used. With small hammers and tacks, give the children much practice in driving and withdrawing tacks and nails.

Tables may be made by nailing a piece of thin wood on a cube; chairs, by using a cube for the seat and nailing a piece of wood on for the back. Beds for the dolls may also be made. Boxes for the seed to be planted in, and the utilitarian idea fostered while the play spirit is encouraged.

Making their own toys will be the first lesson given the child to prepare him to build and furnish his home later in life.

The children shall use blocks freely this year for building purposes. Miniature homes will be built, houses for the farmer, stables for the stock, fences dividing the different fields. Correlate language and number, thus: A block represents a fence post, while another block (half the size of the first) represents one-half the post, and the two blocks fitted together make the post; or a block represents a basket containing two apples, which the teacher will give to two children. How many does she give to each, and what part of the number of apples in the basket? Such lessons must be given only in talks and only in the most general way, and nothing must be told the child that he can not see for himself by handling the objects, blocks, etc. By a variety of plays the child will learn to cut the paper in half, divide the pile of corn in two parts, etc. The child must see for himself the truth of the statements made to him. Plays introducing number work will be helpful.

SECOND YEAR.

The child who has been in school one year knows much about handling the scissors and the hammer and is anxious to try again, and with a review of the work of the preceding year he will have acquired skill in using his fingers. He is ready to help the teacher make measures of cloth, marking the inches, half inches, and quarter inches. Much drill must be given in measuring on plane surfaces, such as papers, books, and objects that the child sees daily around him. Have him measure his chair and desk, the size of the room, of the windows, each pane of glass, the distance between desks, the size of the teacher's desk, etc. Measure the height of the pupils, have them cut paper
forms to measurements given. Let them cut squares (and other forms) of different sizes. Have them divide squares in halves, thirds, fourths. Familiarize the pupils with the fractions $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ as much as with the forms.

Have the children make from measurements the geometrical figures in clay and with cardboard.

In almost every locality there is clay to be had, which will serve all purposes. If a thorough search is made, there will be but few places where it cannot be found. Wherever bricks are made especially it will be easy to obtain.

With a little perseverance the pupils will become thoroughly familiar with the use of ruler and understand the value of feet, inches, and the fractions of the inch. Drill continuously in this work until they can take measurements intelligently and unaided, for the value of this foundation, if well laid, cannot be overestimated.

Unless the ruler being used is a thin-edged ruler have the pupil hold it on edge when measuring, so that the division lines between inches, etc., will come down to the surface which is being measured. If this is not done, the markings are very apt to be inaccurate.

Extend the measurements to the yard, where each one must help to measure off his own garden, endeavor to make his rows of vegetables straight, and see that they are an equal distance apart. See that they plant in straight lines the portulacca or other flower seed that outline each plot of ground. Have the cabbage plants equally distant from each other, etc. Have pupils measure the yard of the school; also the length of the fence, size of gates, width of road, dimensions of barn, etc.

This course is a mere skeleton of the work to be given the children. The teacher is the moving spirit, and the needs of the school will suggest many practical and valuable lessons that may be presented.

Very simple tools only are needed to successfully give much valuable instruction in this work. Hammers, tacks, and nails will be needed; also jackknives, try squares, rulers, pencils, and a piece of oil-cloth or something to throw over the desk for protection; also a little lumber, which must be thin. Pupils will make their own rulers and try squares from one which the teacher will use as a pattern. Teach
how to handle the knife in a safe manner. Show them also how to hold a hammer properly and how to hold a nail, then to strike and drive the nail without marring the wood. Have them pull out some of the nails without injuring or scratching the wood. Do the same with tacks and smaller nails.

The lessons presented by the class-room teacher to be done with the jackknife will be:

1. Straight whittling.
2. Oblique whittling.
3. Cross whittling.
4. Point whittling.
5. Cutting along the grain.
6. Cutting partly across the grain.
7. Cutting lengthwise with the grain without splitting.
8. Cutting crosswise the grain.

Also teach—

Using the hammer correctly.
Sandpapering.
Marking and lining.

Let the children have some work involving boring with gimlet.

In giving these lessons the pupils will make crochet needles, flower sticks, butter paddles, paper cutters, and other simple articles needed in the class room. The children have some idea of numbers from the work last year with blocks, and the teacher will correlate number and language with the lessons in woodwork. More extensive building with blocks will be carried on this year, and much number work unconsciously given in handling them. From such instruction the pupils should have a clear conception of the four fundamental rules of arithmetic. The numbers and fractional parts may be written on the board incidentally, but no written work will be required of the children, except as they desire to make the figures themselves.

(For suggestions and helps in teaching woodwork in the class room, teachers will find the books, How to Use Woodworking Tools; Knife Work in the School Room; First Lessons in Woodworking; Sickles’s Exercises in Woodworking, and many others, of great value.)

THIRD YEAR.

The importance of giving pupils sufficient practice daily in using the 2-foot rule and square until they are able to take measurements correctly can not be too strongly emphasized. From teachers of carpentry throughout the service in every section comes the regret that pupils coming to the shop have to be taught to take measurements correctly. This work must begin in the class room as soon as the child is able to understand the rule, which will be not later than the second year, and the child must be shown in the class room every day
how to use the tools correctly and take measurements accurately until he is fully able to do it alone. Pupils this year must make a 2-foot rule under the direction of the teacher. This being the rule most used by carpenters, it is best to put it into the hands of the child as soon as possible. When the pupil goes to the carpenter or blacksmith shop, or, indeed, to any workshop, unable to take measurements, much time must be taken by the teacher there in instructing him in this most important lesson. This work must be taught thoroughly in the class room, and to this end the class-room teacher and teacher of carpentry should confer, discussing where the pupils are weak in doing this work and in what direction they need to be strengthened. It is an injustice to the boy to send him to the carpenter shop, where there are so many important lessons to be learned, unequipped to take up the work there. By teaching a boy to do this work thoroughly he will be ready to make greater progress.

By this time the children are quite ready to do earnest work, along the lines already started. The year's work will be a review and continuation of the work of last year, all of which should be carefully carried out. Pupils will now know how to use the ruler and tape line intelligently. With a little effort they can themselves make 2-foot rulers of soft pieces of wood selected by the teacher from the carpenter shop, or prepared for them by older pupils. Marking off the inches will be quite easy for them now, and a substantial and useful tool will be the result. A tape line must also be made, since there will be plenty of measuring in connection with the work in numbers this year, indoors as well as out. We are aware that this work has been given before, but it must be repeated, since it is highly important that it be executed well, and this year the measures and rulers should be compared with those made last year, which should be kept by the teacher for this purpose, to show them their advancement and to stimulate effort.

In the work of whittling, the children will be able to make square and round sticks, pointed and notched ends. The teacher should first make a drawing on the blackboard of anything to be cut, the children themselves executing the drawing, thus imaging the work to be done before taking the knife in hand.

Many useful articles are to be made this year for the pupils to use in their work in the class room in cooking, sewing, etc.

The work in wood that will teach the child to make a table or something equally useful as soon as he begins to use tools is the work that we must give the pupils; hence the great need for joinery early in the class-room work in wood.

Joinery should be taught carefully. Give the halved joints and the open mortise and tenon joints. This will enable pupils to make frames for the seats of chairs, in which holes can be bored around the edges
with a gimlet. On these frames the lessons in caning are to be given; thus making the seats of the chairs to be manufactured in the school for use in the kindergarten and primary departments.

FOURTH YEAR.

This year pupils should be given constant and careful drill in using the 2-foot rule, that they may be able to take any measurements accurately and without aid.

Review this year boring with gimlet and the halved together joints, and give chamfering with jackknife. Then take up:

- Half-lap joint.
- Open mortise and tenon joint.
- Mortise and tenon joint.
- Miter joint.
- Miter half lap.
- Dowelling.
- Dado joint.
- Half-dovetail joint, halved together.
- A dovetail with single tongue; with several tongues.
- The locked joint.
- Scarf joint.

Where the teacher has taught joinery thoroughly, the pupils will be able to make a box, finished complete, and without help.

The class must also become familiar with the gauge. Drill the class at setting gauge at different graduations, then give much drill in using the gauge until each pupil is perfectly familiar with the use of the tool. See that the proper hand is employed in using the gauge.

To test their ability to measure accurately, the pupils this year should make all the blocks that are needed for building purposes in the class room and for teaching numbers in the lower grades. This will, of course, require careful, accurate work, since they must be so made that a number of them fitted together will make a larger block of regular proportions, such as putting together the fractional parts to build up a cube.

Drawings will be made from measurements given of all work, such as blocks, joints, etc., before executing it.

Some simple furniture might be started this year.

IN THE SHOP.

PREFACE.

Carpentry must be taught so carefully that pupils not only acquire skill, but understand the principles that underlie the work.

A pupil must first be put on work that is simple—repair work, helping mend fences, walks, furniture, etc. As he learns to use tools
skillfully he is advanced to more difficult and complicated work until he becomes familiar with every branch of the trade. By perseverance a pupil may soon be capable of doing work that will make him valuable at school, to his employer, and of inestimable benefit to himself, upon his return home.

The carpenter will see that pupils acquire a workmanlike and skillful use of the various tools, teaching pupils how to sharpen and keep them in fit condition for work, and that they are kept in their proper place. He must give them a variety of bench work which will bring into use all the tools commonly used in the trade.

Pupils must be carefully taught to lay foundations. Pupils must also be taught to lay out and construct centers and window frames, make case and hang doors, lay beams and set bridging in same, erect stud partitions, and lay flooring. A course in joinery;
also the way to lay sheathing and shingles on a frame house must be taught. In Indian schools it is advisable for carpenters to know something about plastering, that they may be able to teach pupils how to apply the scratch coat of plastering on walls and ceilings; after this hardens, putting on the brown coat, and finally the hard finishing.

In bricklaying, teach pupils how to handle the trowel and how to spread mortar; to lay bricks properly, that the joints are neatly pointed: the properties of mortar and cement, and how they should be mixed.

In the course in drawing it is not intended to make expert draftsmen, but to give such instruction as will enable pupils to readily read drawings, both of plans and of work, such as generally come before a mechanic in his trade.

IN THE CARPENTER SHOP.

A little time spent in teaching boys the A B C of carpentry is wisely spent. An experienced boy may be given the charge of a number of small ones, and, with the supervision of the carpenter, give them exercises in—

1. Measuring.
2. Properly driving in nails, seeing to it that they learn the correct position of the body in holding the hammer, and giving them drill in—

   (1) Position before swinging the tool.
   (2) The wrist movement.
   (3) The elbow movement.
   (4) The shoulder movement.

He should give drill also in the proper method of withdrawing a nail, boring holes, using the jack plane, the smoothing plane, the jointer plane, and the block plane (some of this the pupils may already have had in the class room, but they will need it repeated in the shop); exercises in measuring on a plane surface with rule and knife; squaring with try square; ganging with marking gauge; sawing to a line with rip, crosscut, and back saws; planing to true surface; planing ends smooth and true with block plane; lining rough lumber with straight edge and pencil; making the half joint or box halving; making the dado or cross groove; nailing butt joints, mortising and tenoning, boring and making joints fastened with screws; gluing; making a smooth surface with plane, scraper, and sandpaper; grooved work; making miter joint: making irregular bevels; making dovetails; laying out and sawing curved work. (Each of the above exercises worked in free-hand drawing from a model prepared by teacher. The model then set aside and the object reproduced from the drawing.) Talks on materials; care of tools; difference in woods—their relative value; ascertaining the age of timber by counting the rings from the center
of the tree to the bark; the reading of drawings; the care of lathe
and names of parts.

In most instances each school has, or should have, a repair and car-
penter shop supplied with general carpenter's tools, circular saws,
small saws, upright molder, and mortising machine. It is expected
that students will do the general repair work of the buildings and the
furniture connected therewith; also that they shall assist on new work,
such as making tables, chairs, settees, rockers, desks, shelves, and
anything that may be desired for the comfort and pleasure of the
school, and for which a drawing must be furnished by the person
desiring the same, or such description given that the teacher and
pupils may execute the drawing before doing the work.

Each student should, where possible, have a bench containing a kit
of tools, the use of which he is carefully taught by exercises in planing,
nailing, boring, sawing, gluing, and making joints, and the framing
of rafters should be carefully taught.

Boys will enjoy making models of buildings.

One and one-half inches to the foot is a good working scale, and
there is always sufficient refuse lumber around carpenter shops to give
the boys plenty of material with which to build models of houses,
barns, sheds, etc.

Pupils must be carefully taught the care of all tools, how to sharpen
them, and have a proper place to keep each one.

When new buildings are in process of erection or old ones being
repaired, the boys should be actively engaged in the work and do just
as large a part of it as possible, for there is nothing which will be of
more permanent and actual value than experience of this kind. Draw-
ings of plans for buildings should be made by pupils under the teach-
er's direction in the class room as well as in the shop. The greatest
stress must be laid on plain house building, including foundations,
walls, arches, and chimneys. Lessons on lime and cements and brick
making must be given in connection with this work. Every boy must
be taught to make mortar and to plaster a house.

Lathing should be taken up with plastering. Practice should be
given in brickwork, both in new buildings and the repair of old ones.

Should there be no buildings in process of erection by which the
pupils can have the benefit of the practical experience which is so
valuable to them, it is suggested that a small model house be built
entirely by the students. It might be about one-fourth size and in
every other respect be exactly like a dwelling house. This would
afford the much-needed opportunity for training in taking measure-
ments and in the principles of house building. The plan would also
be made by the boys, and should be simple, not more than three or
four rooms, perhaps. This has been tried at one school, and the
enthusiasm aroused among the boys of the school, and even among
those of the neighborhood for miles, was quite remarkable. The house was afterwards disposed of for a good sum to a citizen, who secured it as a playhouse for his children.

In schools where it is possible, a course in wheelwrighting should be given, that the student may be able to handle the work of the ordinary wheelwright shop. Students on completing the course will be expected to be able to build a light farm wagon from beginning to end. They should be able to make a drawing of all the parts of a wagon from memory.

A course in blacksmithing should go with this work. It is also well for the wheelwright to know something about plain wagon painting.

Special stress must be laid on building and repairing fences, and repairing houses and outbuildings necessary on a farm; also to repair

work on wagons and other vehicles, to the end that the boy upon his return to his home may be able to mend his wagon, keep up the repairs on the buildings and fences on his farm, and erect any buildings he may need or desire to have for the comfort of his stock or the convenience of his family.

It is well to instruct the Indian boy in mending and making furniture, for with this ability he can easily make many pieces of substantial furniture for his home and thereby add to its beauty and comfort.

Pupils who show special proficiency in this work are advised to go to some one of the schools equipped to give complete instruction in the trades.

The following is the course which must be given as outlined:

If the school is not equipped to teach as much as is laid down in this course, they will give as much as possible, sending the well-advanced
pupils to the nearest nonreservation school where they may have better facilities for learning this most important branch of work.

Where a more extensive course is possible, the teacher will give the pupil an opportunity to learn as much as he is capable of taking.

1. Planing.
2. Planing and squaring to a given width and thickness.
3. Planing to a given bevel.
4. Planing to a square piece of four equal sides.
5. Making and proving a straightedge.
7. Rabbeting.
8. Dadoing.

11. Rabbeted frame.
12. Plumb rule.
13. Boring (three pieces).
15. Casing rabbeted frame.
16. Stop chamfers (five patterns).
17. Square box post, chamfered.
18. Rule joint.
20. Window frame for a frame house.
21. Window frame for a brick house.
22. Pentagons, hexagons, octagons.
23. Joinery: (1) Halved-together joint; (2) half dovetail joint; (3) open mortise and tenon joint; (4) blind mortise and tenon joint; (5) mortise and tenon joint; (6) miter joint; (7) miter joint with open mortise and tenon; (8) an open double mortise and tenon joint; (9) blind mortise and tenon joint suitable for the end of a brace; (10) dowel joint; (11) dovetail joint.

24. Corner post.
25. Jamb and door.
26. Sash work.
27. Large doors.
28. Closet seat.
29. Nest of drawers.
30. Stairs.

FIFTH YEAR.

The instruction in carpentry in the class room from this year on will be largely in computing the cost of quantities of lumber, the price per 1,000 feet being known. Have pupils compute the cost of, and estimate the amount of lumber necessary to build a house of two rooms complete. Have them estimate for the weatherboarding of a house of one room; of two rooms; four rooms. Estimate the cost and amount of lath needed for houses of different sizes. The cost of shingles and the number required for roofs of a number of sizes will give good drill. Have them find the cost and amount of lumber required to erect the frame of houses of a number of sizes. Find the number of feet of lumber needed to floor the different rooms of houses of given sizes. The amount and cost of lumber for door and window frames, also for doors, will be another practical question. The lumber for board walks of different lengths and for fences should also be found. Have them describe the quality of lumber required for the different purposes. Estimate the cost and amount of lumber required to build barns, chicken houses, and other outbuildings needed on a farm. The main object to be attained is to secure the greatest amount of comfort for the least expenditure. Emphasize the necessity for using the right material in the right place, and good workmanship, showing that a little thought and care put into the work will repay in the "long run."

Have each pupil make plans and drawings for the buildings he thinks he will need, and thinks he can afford to erect, upon his return home, these plans and drawings to be examined and criticised in class.

Discussions as to the best location for a house, the most desirable direction to have it face, whether it should be built on high or low ground; locations for outbuildings—all these questions have to be considered by the pupil at home and must be talked of in class.
Ability to compute readily the amount and cost of lumber needed for a specific purpose will be of inestimable value to the boy in the carpenter shop, and the help the class room gives him in this direction will materially aid him in his work at the bench.

Encourage the pupils, both boys and girls, to look to the future, planning for their homes—what kind of a house they can afford to build, how arranged, what outbuildings, etc., what industries they expect to carry on, and the most important lesson of all, to make them feel the necessity for saving a little each day or month, that they may have some capital to start with and be able to secure some of the comforts they would appreciate and enjoy in their own homes.

This lesson can not be impressed too often, but as the pupils grow older and the time approaches for them to leave school they will be better able to appreciate the importance of such advice.

CONCLUSION.

The course in carpentry here given is not intended to be the limit to which the teacher should go in this work. It is merely a skeleton, giving the teacher a general idea of the lines on which to proceed. It is expected, of course, that the teacher will do as much as is here laid down, at least; but it is hoped that in most cases the instructor will not be content with doing this, but will broaden out much beyond its scope, observing, of course, the general plan and ideas endeavored to be given herein.

In concluding this necessarily very brief course in carpentry, the importance of holding the work strictly within practical lines can not be too strongly impressed upon the instructor. Beautiful and unique creations of the carpenter's art are doubtless pleasing to the eye,
but such are not the things best for the Indian to learn to make. We must look at the unvarnished facts exactly as they exist and endeavor to realize the probable condition, after they have left school, of the boys whose future we are shaping. When the instructor has thus grasped the situation, he must endeavor to train his charges to meet it when thrown upon their own resources. In giving instruction he must constantly keep in his mind's eye the probable future environments of his students, and thus intelligently plan and strive to prepare them to overcome the difficulties that will stand in their way. When he has done this he will readily see that teaching that is not practical and useful is of little value. Occasional indulgence in ornamental work and in novelties is desirable in order to stimulate interest and make the work pleasant, but work of this kind should be kept within bounds and be merely incidental.

"We learn to do by doing." It is a maxim that is without exceptions, and applies to every branch of human endeavor. Therefore, the carpenter should be constantly on the watch for work on the farm or about the school establishment that will enable him to give his pupils actual practice in what they have learned in carpentry. When fences are to be built or repaired the boys should be called upon and their services utilized to the limit. When walks are to be laid or mended give the work, if possible, entirely to a detail of the boys. And likewise with any other new work or repairs about the institution. The carpenter can invent many ways of making work of this kind agreeable and pleasant, although as a rule they will much prefer it to any other way of learning. Endeavor to arouse their interest and pride in the work they are doing. Manifest a lively concern in their work and their achievements, and be generous in praising their honest efforts and faithful application.

If a new building is in process of erection, an opportunity of the utmost value presents itself to the carpenter and his pupils, and he can not afford to neglect or slight it. Even before the work begins the carpenter should obtain a copy of the plans and discuss them with the boys, allowing them to express their judgment as to location, materials, etc. By thus going into details and getting the interest of the students thoroughly aroused, they will watch every development and process with keen curiosity, and before the building is completed they will have learned more about actual, practical carpentry and building than could be taught in many times the same period by ordinary application to the work. The boys should be actively employed in the work of construction, and must be allowed to do as large a share of the work as they are able, and during the erection of the building the class in carpentry should assume unusual energy and activity, in order that advantage may be taken of the numberless and varied illustrations and demonstrations furnished daily by the progress of the work.
Talks should be given frequently on the subject of carpentry. Houses for farmers, model barns, stables, granaries, etc., will form good topics.

Show the boys that you feel a deep interest in their future. Talk to them individually at every opportunity and encourage them to tell you about their plans for the future, about the farm they will have, the little home upon it, the barns, outbuildings, etc. Once get them to thinking and planning independently and you have gotten their minds into a sympathetic and receptive state that will render your work much easier and impress what you teach readily and permanently upon their minds. They will unconsciously arrange and apply what they hear to their future plans, and thus have it in intelligent and harmonious order, to be called forth whenever they attempt to do anything requiring it.

The class-room teacher will make arithmetic and carpentry aid each other, and she will, by thus making the work in carpentry a part of the lesson in numbers, be able to economize time and labor. In the construction of a single house the carpenter is obliged to solve problems involving nearly every arithmetical process. Give problems in computing the quantity of lumber required for laying several walks, taking those around the school buildings as examples and letting the children measure them themselves. Also give problems in figuring
the quantity of earth necessary to be excavated for a cellar, the perches of stone in the wall, the amount of lumber required for floors, lath, plaster, and paper for the walls and ceilings, bricks for the chimney, shingles for the roof, etc. Then have them compute the cost of each kind of material and the entire cost of the building. Do the same with the barns and outbuildings. Thus innumerable problems may be given by the teacher in almost any part of arithmetic applying to the work in carpentry.

In the same manner, many other subjects may be made to correlate with carpentry, which will appear to the teacher upon a little reflection, and which need not be mentioned here.

Both the instructor in carpentry and the class-room teacher should impress upon the students in every year, the necessity of saving their money in order that they may have something with which to build their house and other buildings when they begin life for themselves. The instructor will be able to devise many ways by which this lesson may be effectually inculcated.

The boys should be trained in habits of thrift and economy. Show them how fragments of lumber remaining from a certain piece of work can be advantageously used in other ways. Permit no unnecessary waste.

Endeavor to foster a spirit of discussion among the boys as to the best manner of building houses, barns, etc., the most effective way of making stables warm, the advantages and disadvantages of underground stables, the sanitation of chicken houses and pens, the various kinds of fences, and innumerable other subjects that will be continually arising.

To Prof. F. K. Rogers, director of the Armstrong-Slater Memorial Trade School, we are indebted for valuable suggestions and advice in the preparation of this work.
COOKING.

This most important department in the school should teach the girl lessons in home making and equip her with the ability to prepare appetizing meals from ordinary material, to enable her to make the home comfortable and attractive, to establish habits of neatness, promptness, and order, and to teach lessons of economy in the use of provisions. She must learn to make fires, using care and economy in the use of fuel. She must learn the proper care of the stove, the kitchen utensils, the dishes, and to set the table neatly and serve the meals in a dainty, appetizing way.

The course in cooking embraces keeping the dining room in good order, the care of table linens, washing dishes, and the setting of the table. The kitchen should be the center of attraction for the careful housewife, who must plan the menu, prepare, cook, and serve the meal.

The first year in school should be occupied with work as nearly as possible like the familiar events of daily life in the home. This will materially assist sense development, will teach the child to speak English, assist him in acquiring systematic ways of living, and make him feel man's dependence upon and consideration for man.

The cooking lessons given this year may be simple and only what the child can understand and do herself, giving her experience in handling utensils and food, and showing her that whatever is done must be done correctly.

In Dr. Dewey's school the cooking of cereals is taught first, as this is probably the very simplest article of food to put into the hands of the small child to cook. Have the child measure the amount of cereal to use and the exact amount of water necessary to cook it. A cup is a good measure to use, accustoming the child to measure one-half, one-third, and one-fourth of a cup. She will thus learn to handle fractions in a most familiar way and understand their significance. The child must be taught to plan a meal for one person, for two, or for three, or any given number, multiplying the amount for one by the number to be cooked for. Later the child will be able to write recipes, showing the amount of material to be used, the quantity of water to be added, and the length of time required to cook the material thoroughly. She thus learns unconsciously to tell time.
In the lessons in cooking, the pupil must be shown the advantage of modern utensils. She must also be shown how few utensils are absolutely necessary, how a large box may be fitted with shelves and used as a closet, a long, round bottle for a rolling pin, and with an outfit costing not over a dollar that she is equipped to go to housekeeping and prepare comfortable meals.

The pupil must be taught the relation of fire, air, and water to life and to cookery. She must study the stove first and the use of the damper and different kinds of fuel; also the care of cooking utensils.

Instruction in cooking must be given each year the child is at school, first in the class room, and then in the kitchen, where she will have an opportunity to put to the best use the instruction she has received in the schoolroom in helping prepare the meals for the school, and later where her self-reliance will be put to the test when she will be expected to prepare the entire meal for one table in the dining room.

The pupil must be taught the care of milk, butter, and cheese making, and the proper care of milk vessels. She must learn to make yeast and bread, and the different ways of using stale bread, making toast, pudding, filling for roasts and fowl, and to grind into crumbs to be used in frying. She must be taught to:

- Make soup;
- Cook eggs;
- Cook fish;
- The different methods of cooking meats, to extract and to retain the juices;
- Preparing and cooking vegetables;
- Making gravies and sauces;
- Pies, cakes, and simple desserts;
- Simple cookery for the sick;
- The proper disposal of refuse; and
- A general idea of the care of food boxes, refrigerators, sinks, and drains.

The young housekeeper must understand how to care for stock and to milk.

She must know how to plant and raise vegetables and wisely plant seeds so that she will have crops of lettuce, radishes, and other vegetables coming on for use after the first crop planted has been exhausted.

She must be taught to have pantry and garden so arranged as to be able to keep her table supplied with wholesome food in season. She must know how to use poor cuts of meats and pieces left over from other meals, cooking them so that they will furnish an appetizing and digestible meal.

It is especially important that girls be taught cooking accounts, and the ability to live within the income.
Mrs. Emily Johnson, the excellent teacher of cooking at Haskell Institute, Lawrence, Kans., outlines the work for her cooking classes as follows:

**MATTERS TO BE CONSIDERED IN THE ARRANGEMENT OF COOKING CLASSES.**

I.
- Equipment for class work.
- Food materials available.
- Uniforms.
- Size of room.

II.
- Classification of pupils.
- Age and capacity.
- Home conditions.
- Grade in school.

III.

**METHODS OF TEACHING.**

Always proceed from the known to the unknown. What can not be drawn out from the pupils’ past experience, leave till later.

Have an obvious reason for one subject following another.

The reason why one method of doing a thing is better than another is always given.

**EQUIPMENT.**

A complete outfit is desirable to teach the advantages of modern utensils. Lessons are given in using a small number of utensils to show how few are absolutely necessary. This has been done by having a small kitchen and dining room scantily equipped where two of the second-year girls have been placed, arranging their own bill of fare and getting a meal for 16 pupils, thereby learning responsibility and self-reliance. Food materials vary so much in different sections lessons must be arranged according to supply and the season of the year.

**UNIFORMS.**

An apron and cuffs or sleevelets are indispensable; a cap undesirable unless each girl can have her own.

**CLASSIFICATION.**

Size of class depends largely upon size of room; may number from 10 to 20. Pupils come to the cooking class from the various details at school hours, except two housekeepers, who come at work hours, that is, two girls come in the morning at 7:30, the remainder of the class at 8:45, and remain till after dinner. The afternoon housekeepers come at 1 o’clock, doing up the dinner dishes, the remainder of the class coming at 2:45, remaining till after supper, the afternoon housekeepers finishing the cooking dishes, the morning housekeepers coming back to do the supper dishes.

They are graded according to their previous home training, mental aptness, and grade in school.

**Lesson I.—Home making.**

We talk over the subject of home, drawing from the pupil the answer we wish her to remember.
The first thought to impress upon the mind is this, a home is not a home unless it be a permanent abiding place and a house. It may be with the latest improvements, or it may be a house with two rooms and the least possible amount of furniture. It must be governed by habits of neatness, promptness, and order. Develop the thought that the child's first lessons in vice or virtue are learned in the home.

We study the stove to understand the use of dampers; we call attention to the kind of fuel used, and make it the subject of a future lesson, which includes the use of wood, coal, kerosene, or gasoline; cooking utensils are observed, their names and uses learned; the setting of a table and simple lessons in serving may be taught in connection with any of the first lessons.

Lesson II.

Milk was the subject considered, because it is the first food, and because at the time it needed immediate attention, also because neatness, promptness, and order (the connecting link with previous lesson) are indispensable to the proper care of milk.

As the subject must be considered first as a perfect food, second as the principal ingredient in many dishes, and third for the purpose of butter making, three lessons were none too many to get the subject properly before the pupils.

Junket was made to illustrate the change which takes place when milk is taken into the stomach. With this lesson began the serving of a simple meal, with one or more dishes prepared from milk, together with food prepared in the children's kitchen. A regular meal is prepared with each lesson, instead of one dish at a time, so the bill of fare is arranged and certain dishes assigned for two girls to assist each other in preparing; the following week the next two girls will prepare that dish, being told how by the first two girls.

Lesson III.—The four principal elements.

Although many substances enter into the composition of animal and vegetable bodies, we attempt to remember on the following: Oxygen, nitrogen, hydrogen, and carbon, which are the four principal elements found everywhere in nature; hence we must know what parts of the human body these elements enter into, and what foods supply them.

Lesson IV.—The five food principles.

From valuable charts obtained from the Department of Agriculture on food and diet, and from various other sources, we learn that all substances that nourish the body are classified under the name of five food principles, stating where they are obtained and what parts of the body they build up. As these principles are made up of oxygen, nitrogen, hydrogen, and carbon, this fact forms the connecting link with previous lesson.

Lesson V.—A meal.

The pupil is now able to tell what may be found in her breakfast that will nourish different parts of the body. This, with a few simple dishes prepared for their dinner, completes the lesson.

Lesson VI.—The average man.

This lesson is illustrated by a cube, representing a person weighing 156 pounds, showing the amount of each of the five food principles found in different parts of the body, also the amount of each needed daily.
Lesson VII.—Measurements.

Correct measurements are necessary to secure good results.

Lesson VIII.—Cooking.

We are now ready to consider the different processes of cooking and the materials used.

Thus far the pupil has only learned to "do by doing;" now she is prepared to learn how and why; hence a thorough knowledge of the foregoing lessons is indispensable, as it forms the basis of all future work. She is now ready to begin the cooking of different foods, commencing with the most simple, at the same time learning the history, composition, nutritive value, etc.

Subjects have been taken up in the following order: Beverages, cereals, light bread, batters and doughs, vegetables and white sauce, meats and brown sauce, eggs, cakes, puddings and sauces, pastry. Salads, fish, gelatins, ices, etc., have been considered whenever we have had material to work with.

The aim of our work has been this: Strive to be an intelligent worker—know everything about the article used; skill will come with practice.

The Boston Cooking School Cook Book is recommended by Mrs. Johnson.
Dairying.

Dairying goes hand in hand with farming, and may almost be said to be a part of it. Every thrifty, ambitious farmer, unless the circumstances be exceptional, runs a dairy, large or small, in conjunction with his farm. The two industries are of mutual assistance and of mutual benefit. A dairy utilizes and makes profitable many otherwise waste products of the farm, uses to better advantage than could otherwise be done many of the regular crops, and renders of value as pasture land numerous acres unsuited for cultivation, while, on the other hand, it provides fertilizer with which to enrich and improve the soil. In numerous cases the dairy brings in a larger income than the farm itself. Thus it is seen how very essential is the teaching of dairying to the Indian boys and girls. It is desired that this branch be taught in every school where the conditions do not render it absolutely impossible.

If the school does not already possess a dairy, a beginning must be made at once. It need not be pretentious at first; in fact, it is better not to be. Make a commencement with a few cattle—four or five is a good number—and a good sire, and then increase gradually. The cattle selected should be of as good a grade as possible. Holsteins, Durhams, Guernseys, and Ayrshires are all good breeds. Discouragement must not arise, however, from the fact that it may be impossible to get high-grade cattle at first. In such a situation an effort should be made to procure a good sire of standard breed, preferably a Durham, and then the best cattle to be had in the vicinity. Then by raising the calves and disposing of the poorer grades the quality of the herd can be gradually improved until it reaches a high standard. It may be well to change the sire every two or three years.

The buildings for the dairy will not need to be elaborate or expensive at first. They can in most instances be erected by the school carpenter and the boys under his charge. The boys of the class in dairying must also assist, as the work will be very helpful to them in many ways.

The teacher of dairying will here have an opportunity of teaching the pupils lessons of much value, for by exercising ingenuity in putting up buildings with as small an outlay as possible, and by showing that they need not be elaborate, he will be able to impress upon them
an object lesson as he could in no other way, and it will be one which will bear fruit when the students make a start for themselves.

All that will be needed at first will be a plain stable, sufficient to protect the cattle from the weather. Until a barn is provided, the hay and fodder may be kept very well in a stack.

At schools where a dairy already exists, some of these instructions may not be necessary, but they must nevertheless be taught and drilled into the students in order that they may each know how to begin dairies of their own.

Give the students frequent talks upon the matters touched upon above, and in every way and at every opportunity endeavor to prepare each to be able to begin correctly a dairy of his own. Impress upon the pupils that the beginning of a dairy, as has already been said, should be modest, but upon a good foundation. Two or three good cows are worth more by far than a dozen poor milkers. The expense of feeding an unprofitable cow is just as great as the cost of feeding a profitable one. If the beginner gets the proper start with a small number of animals, the experience he will soon acquire will enable him to safely and profitably increase his herd indefinitely. And this is the best reason for a small beginning, i. e., that there is better prospect for success than if he attempts too much at once and before he has had experience. As in everything else, the growth of his dairy should be gradual and healthy.

All these points are very important to be taught the student, and the instructor will find many others. He should also endeavor to adapt his instructions to the particular locality and the conditions peculiar thereto.

The work of the dairy will be begun by the child quite early in his school life, when he assists in his small way in the care of the cattle, driving them, and doing many other light chores. Every boy in his turn should be given work of this kind to do. By the actual work of feeding and the instructions of those over him, he will learn the proper kinds of food for the different seasons—the amount of feed, hay, fodder, etc., required, and a great deal about the proper care of the animals.

Teach the boys to handle and treat the cows gently. They must not be abused or frightened, as this injures their milking qualities. Give talks and instructions on stables; how they should be constructed, the value of raised platforms, and of stanchions instead of ropes. Stanchions that turn on a pivot and enable the cow to move her head any way she desires are comfortable and valuable. See that stables are cleaned regularly and the bedding kept fresh. Have the boys card and brush the cattle every day. During the season when the cattle must remain in the stalls through the day they should be given water twice each day. For a healthy animal it is not harmful to use cold water for drinking.
Both boys and girls will be taught to milk. The student can begin to learn milking at from 12 to 14 years of age. It will depend upon his size chiefly.

Instruct them in the proper method of milking, always using both hands. Have each one to provide himself with a milking stool of some kind (a soap box will serve the purpose) and sit while milking. A kneeling or other posture is wrong. Each one must also be appropriately dressed in garments not easily soiled. Uniforms or good clothes are entirely out of place in such work, and the instructor will see that they are not used.

After the student has learned to milk, he should be given a certain number of cows to milk daily night and morning. Each boy can milk from five to a dozen cows, and where there are a large number of cows they should be given this many to milk at least. Begin with a few and gradually work up. The tiring of the wrists, so noticeable at first, will soon wear away. Many Indian boys milk regularly as many as eighteen cows.

Another thing that is very important is to milk cleanly. Boys are apt to be careless in this respect, and the instructor must give it particular attention, as if it is not done the cattle are liable to be injured and the supply of milk decreased. He should occasionally make tests after milking, to see that this point is observed.

Regularity is an essential to the best results. Appoint certain hours for milking in the morning and evening, and then see to it that the milking is done at those times. There should also be a prescribed time for feeding. Keep a record of the amount of milk each cow gives.
The entire work of the dairy should be done by the boys, the instructor devoting his whole attention to supervising their work, giving them instruction, and endeavoring in every way to improve them. He should read good publications on the subject and require the students to do likewise, and he should give talks and assign reading on the subject of breeding and on the feeding and care of cattle.

Give frequent talks on the standard breeds of cattle; the relative merits of Holsteins, Durhams, Ayrshires, Jerseys, Guernseys, and other breeds as adapted to the particular locality. Explain which are better when quantity of milk is desired, and which when butter is the object, Holsteins and Durhams being better for quantity of milk and Jerseys for butter-making qualities. Durhams are good for beef. Ayrshires are hardy and adapted to cold countries. As a whole, cattle of mixed breeds, or "grade" cattle, are usually found most satisfactory. It is important to secure the very best sire that can possibly be had. The best is not too good. As said before, this is particularly the case where cattle of a good grade are difficult to get, and this point cannot be too strongly impressed upon the student. When he starts a dairy of his own, if he must be content with comparatively inferior cattle, then he should procure a good sire, and thus gradually improve the quality of his herd.

An excellent ration for cattle in winter may consist as follows: Five parts wheat bran, 2 parts corn meal, and 1 part cotton-seed or oil meal. Ground oats should be used occasionally also. About 12 pounds of this feed per day is ordinarily the proper amount, but will, of course, vary with the circumstances. The oil meal is very valuable for the fat it contains, replacing the fat taken from the animal in the milk. It is quite impossible, however, to make a rule for feeding cattle. One must be governed by circumstances and use common sense.

For fodder; clover, prairie hay, and cured cornstalks are excellent. Ensilage is especially good and very economical. It is said that more cattle can be maintained from a given acreage by the use of this food than from any other.

As a rule, the calf should not be left with its mother longer than from 12 to 24 hours. This, however, will vary somewhat with the circumstances. The shorter the period the better. Teach a calf to drink by allowing him to suck at a finger held down in a pail of freshly drawn milk. This will be found to be very easily accomplished, if a little patience is exercised at first. For the first few days the calf should be fed wholly on milk, then a little prepared meal may be given him, and gradually the amount of solid food may be increased. Do not mix the meal with the milk, for then he will swallow it without its being mixed with saliva, and the effect is bad. Do not give too much milk. If allowed, the calf will nearly always drink more than is good
for him, with the result that he scour. The best milk to use for the calf is, of course, that from its mother, but after a week or two he may be given skim milk.

The milk from the mother will be perfectly good to use after the eighth or tenth milking, unless the circumstances are unusual. The notion widely prevailing, that it is necessary to wait ten days to three weeks, is incorrect.

The cow must, of course, be allowed to "go dry" for a certain time before calving. The length of this period will vary with different cattle, but it is a mistake to make it too long. Four to six weeks is ample.

If a calf is a healthy one of good breed, it should be raised; otherwise it is better to veal it. By following the policy of raising all good calves the dairyman will, provided he has a good sire of standard breed, soon have an excellent herd and one that is constantly improving in quality and always composed of animals in their prime.

Thus far we have treated of the care of the herd and of milking. The handling of the milk and its products is quite as important. While the herd is yet small, consisting of only a few cows, a milk or dairy house will not be absolutely necessary. The milk may be cared for in some suitable room in one of the buildings. The instructor should also impress this upon the students: That when they have a small dairy of their own, they do not at first, nor for a good while, need to have an elaborate or expensive outfit or buildings.

The room used for keeping the milk should be cool in summer and warm in winter. It should always be clean and sweet and a model of neatness. Pans and other utensils not in use must be kept clean and arranged in a neat and convenient way. Each day they should be sunned. The dairy must, above all, look businesslike, and never slipshod or slovenly. The instructor must always remember that he is teaching the students to conduct successfully a dairy of their own, which must necessarily be on a small scale, and he must therefore plan and arrange the work so as to produce this result. If he is so fortunate as to have a separator, well and good, but he must at the same time teach the students to use the spoon to collect cream and to do everything as it is done in small farm dairies. When the boy or girl has learned how to conduct a small dairy well, there will be little difficulty in gaining the ability to manage a large one.

With the small dairies found on the average farms the women almost always have charge of the care of the milk and the butter making, etc.; so in the school the girls will be taught, equally with the boys, this part of the subject. Teach the proper handling of the milk from milking to butter making. The milk is first strained carefully, then poured into properly arranged pans in a cool place for the
cream to "rise," then skimmed, and the cream placed in a receptacle to await churning, and the skim milk put to whatever use may be desired. Skim milk should never be considered valueless or waste. Whatever can not be used for drinking or cooking can be used for feeding the domestic animals, such as calves, and particularly hogs. Poultry will also be benefited by it.

The cream should be kept for a period long enough to turn a little sour, usually a couple of days. Keep it in a warm place over night before churning. The proper temperature for churning will be learned from practical experience. It will usually be found to be about 60° F.

Almost any of the usual styles of churns will answer; the simpler the better. After the butter has collected remove the buttermilk and pour in some cold water and "wash" the butter in the churn. Then take it out and work in the salt. No rule can be laid down as to the amount of salt, one ounce to each pound of butter being the usual quantity. After salting let the butter stand for twenty-four hours, and then work it and put up in packages of a desired size or store in a proper receptacle.

Buttermilk can also be put to many uses, both in cooking and in feeding domestic animals.

The use of the separator, if the school has one, and other appliances will be taught to the students.

The instructor in charge of the dairy will give frequent talks to the students on the work, and give them advice and instruction as to how to start and conduct their own little dairy when they start out in life for themselves. They will also be required and encouraged to read publications on the subject of dairying. Economy in dairying is a subject on which the instructor should have a good deal to say to the students. They should be told how to make the most of their products. In summer and fall, when butter is plentiful and prices low, they should endeavor to pack and store a considerable amount to sell in late fall and winter, when the market is good. The raising and storing of fodder and feed for the cattle is also an important topic for discussion.

The length of time to be spent by each pupil at dairying will depend upon circumstances and will vary according to the capabilities of the student. The instructor will be able to determine this without much difficulty. It is desired, however, that all students receive instruction in this subject, for the great majority of them will have occasion to utilize this knowledge in their after life.
ENGINEERING.

Not all schools will be able to give a course in engineering, for the facilities are often absent. At every school, however, where there is a steam plant and an engineer these facilities will be at hand, and a number of the boys will be detailed to the engineer for training in this branch.

The boys selected for this course should be those who show an aptitude and liking for the work and who possess sufficient physical strength and robust health. It will be very advantageous for each school giving this course to be equipped with sectional models of boilers, engines, pumps, dynamos, and motors of the kind in general use, and also a line of electrical wiring appliances, in order that the construction and the principles governing these machines may be more easily understood. It is also desirable that the pupil should have some experience in the blacksmith shop, especially in bench and vise work, which will be very useful to him as an engineer in making necessary repairs, which he will be frequently called upon to do.

As early as the age of 15 the boys may be used around the boiler room and engine in order to become familiar with the working of the machinery. The boy will learn a great deal in this way, for at this age he is naturally curious and prone to seek out the why and wherefore of everything he sees in motion, and when finally he comes to take up the engineering course in earnest he will already have mastered a large part of the preliminary work. This work of the younger students should consist of cleaning up around the engine, cleaning and polishing it, oiling the parts, putting coal under the boiler, and other similar duties. During their leisure hours they should be encouraged to watch the handling of the machinery and its workings, notice the uses of the different parts, and learn everything possible about it.

The main course in engineering will extend over a period of three or four years, to be varied in the discretion of the engineer. In it will be included instruction and practice in steam heating and plumbing.

The boy can begin learning something about plumbing and steam fitting as early as 12 or 13 years of age. He should accompany the instructor or the larger boys who are doing work of this kind and learn everything possible about it. He can also do little things in the way of fitting pipes, etc.; and the instructor should take pains to tell him everything possible about the work which is being performed.
In this way it will not be long before the boy will be able to do a considerable part of the ordinary work of this character, and will have permanently acquired a knowledge of many of the principles governing plumbing and steam fitting.

During the first and second years of the course the students should be taught the principles of boilers and engines, and possibly also of dynamos and motors. If the school has the models previously mentioned, free use should be made of them until the boy is thoroughly familiar with the different parts, can set the valves on the pumps and engines, erect boilers, connect a series of them, and connect dynamos, motors, etc. The school plant will also be used to illustrate this work, and the pupil must be shown and thoroughly understand every part of it. The extent of the instruction in electrical work will be governed by the facilities of the school and by the sound discretion of

the instructor, who must be careful to see that the fascination of experiments, etc., in electricity is not allowed to distract the boy's attention from the main work in engineering.

Engineering and electrical papers and catalogues of machinery should be furnished to the pupil, and he should be encouraged to read and study them and make designs and models of the appliances shown, that he may keep in touch with modern machinery in general use.

FIRST YEAR.

When pupils have been first detailed to the engineer he will give them a talk on the work they are about to take up. He should make them understand that the work of the engineer is a very important
and honorable occupation, that its mastery requires hard work and study, and that upon the ability and skill of the engineer often depends the safety of life and property. He should tell them that upon their energy, application, and enthusiasm will depend their success in the work of which they are about to learn something. He should likewise explain that not one of them should adopt engineering as an occupation unless he finds that he has a natural liking for the work and possesses the requisite talents for it. He should impress upon their minds the necessity of extreme care in the handling of boiler and engine; that they can not be too careful in this work, and of the danger of tampering with valves or any part of the machinery before they have had considerable experience.

The student should be taught to keep himself clean and neat, and should assist the engineer in keeping the machinery and the engine and boiler rooms clean. This is the time of the formation of habits which will govern him through life, and it is therefore most essential that he now acquire the very important habit of cleanliness and order.

Give the boy an oiler and put him to oiling the shafting. Then let him wipe up around the engine and remove all surplus oil and grease; then scrub the floor, and do such other work as he can.

When the engineer is absent, he can watch things and wipe off the running parts of the engine. Later on, if the engineer should be absent for a day or more, the student can be left in charge of the engine.

Before leaving a shift, the pupil in charge must always have everything in the engine or boiler room clean and in order.

A plan which has been found to produce very pleasing results is to set apart an hour each week, preferably on Saturday, for a general cleaning and setting to rights of the engine and boiler rooms, polishing, etc., after which the instructor makes an inspection of the rooms and machinery. This method is recommended to all teachers of engineering as a very effective means of securing neatness and order.

In the boiler room, where the pupil will be chiefly engaged this year, the first things to be given the pupil to do will be to wheel out ashes and get in coal, oil the shafting, and clean the pipes. Give him some lessons in fitting pipes together, putting on ells and tees and putting in valves. Also while he is doing this work he may learn a good deal about the steam pumps, and he might be given the care of them after a little. At the proper time, a little later perhaps, give instruction in the principle upon which the boiler feed pumps work; how to pack, repair, and clean them, and their care in general.

Then will follow the care of the fires, when to clean the fires and how they should be kept to get the best results from the fuel used. An intelligent fireman can often save in fuel an amount several times greater than his wages.
Show how to prepare the boiler before exhausting the steam for the work of cleaning, how to clean, how it should be kept after cleaning, how to test for leaks, loose rivets, and strained rods. Explain the necessity of a close watch upon the boiler in order to discover such things and the danger of using the boiler while such defects exist.

The detachable parts of the boiler should be removed and the pupils shown how to reassemble them in good order. Then illustrate the proper way of closing up the boiler, how to prepare it for firing, and how to connect it with other boilers. At the same time the pupils must be taught to watch the steam and water gauges, and learn what to do if the steam pressure rises too high or falls too low. Likewise as to the regulating of the water in the boiler. In brief, give everything needed to be known in order to handle and care for the boiler in the best manner.

Give talks on the principles and natural laws which steam follows, and assign work in reading on these subjects in some good books in the school library.

Incidentally, as much repair work on hot and cold water pipes, radiators, and steam pipes as possible will be given the pupils as a beginning of their instruction in plumbing and steam fitting.

SECOND YEAR.

Teach the principles of the engine. Show how to start and stop the engine; how to set up and repair it; how to set its valves; how to pack it and how to take up the wear; how to set the piston; how to oil the engine properly, and how to clean the various parts. All copper and brass parts must be kept bright and the entire engine room maintained in a clean neat condition. This last the instructor must take care to see is done persistently and properly by the student until it has become a habit.
The student must be urged to become thoroughly acquainted with the engine and plant, and should find out the why and wherefore of every part. He should know where each valve leads to and why it is there. He should early learn how to oil shafting and to fill the oil cups and lubricators. He should be taught also to "get the sound" of the engine and to listen to it for any loose parts. A practiced engineer can nearly always tell just as soon as he enters the room whether anything is out of order, and almost where the difficulty is. The boy should form the habit of listening to the sounds that come from the engine and be able to locate a loose bolt or nut from the character of the noise produced. Have the students learn how to make gaskets and do other light work about the engine room.

Practice will be given in running the engine, making steam connections, setting slide valve, giving proper lap and lead, setting eccentric, arranging for proper cut-off, fitting oil cups, speeding governors, fitting belts, lining up, and calculating indicated horsepower.

Give the same care to learning the running of dynamos and motors, their adjustment and care.

When the pupil has learned how to run the engine and has shown that he can be relied upon, he may be used as a substitute to run the engine and boiler in the absence of the engineer. This will arouse the boy's ambition and pride in his ability and is very valuable and necessary in order to impart self-confidence and thoroughness.

Among the things to be learned by the students at this time will be to cement and repair belting, line up shafting, babbitt bearings, pack stuffing boxes, and how to take up lost motion on engine parts and bearings.

Where possible, the instructor in engineering should give some instruction in electrical work, such as to solder electric wires, put on receptacles and lamp sockets, how to put up electric wires, start and stop the engine and dynamo, learn the switch board, read meters, etc.

**Third Year.**

The work of the first and second years will be continued and reviewed and the pupils given as much instruction and work around the engine and boiler as possible, in order to give them a more thorough knowledge and mastery of the work in all its details.

Much attention will be given this year to plumbing and steam fitting. What the pupil has already done will have prepared him for this work, and as he is already somewhat familiar with it he will be able to do earnest and effective work from the beginning.

Instruction will be given in both steam and hot-water heating. Give talks on the relative merits of each system and for what purposes each is better adapted.

Explain the principles governing the working of steam as a heater.
of buildings, and also as to hot water, and see that the pupils learn them by giving review examinations.

Teach how to set and connect different kinds of radiators and how to make the various kinds of coils in common use, such as return coils, miter coils, corner coils, etc. To illustrate this, have the pupils make a coil, using any kind of pipe from three-fourths inch to 2 inches in size.

Follow this with instruction in the piping of dwellings and other buildings. Have the pupils learn the relative merits of the different systems, the one-pipe and two-pipe systems; those with high and low pressure, and the exhaust-steam plan. Give much practice in the fitting of pipes, cutting of pipe, and cutting of threads. Teach the workings of the various systems in detail and illustrate them by experiments until the pupils are thoroughly familiar with them. Have them do as much repair work as possible on steam pipes and radiators. This will give skill in the handling of different tools. The pupils must learn to take measurements on all kinds of pipe.

Take up the steam-heating plant of the school and study it thoroughly. Show the necessity for covering the steam-conducting pipes in order to conserve the heat, the necessity of placing the boiler lower than any part of the pipe system, that the water formed by the condensing steam may return to it, and the reason for avoiding sharp turns in the pipe. The boiler should be located at a central point in order to make the runs as short as possible.

Teach how to lay pipes under ground to outside buildings and the manner of their protection, and illustrate by experiment, if possible, and by the pipes of the school, if any there are. Show how noise in pipes may be prevented.

Give talks on steam-heating boilers, and give problems in finding their heating capacity, which will be be worked out by the boys.

Give practice in estimating the cost of a given piece of work in steam heating.

Give instruction as to the care of pipes. They should always be kept clean—in summer as well as in winter. During the warm season when they are not in use they must be closed up tightly, so as to exclude the air; otherwise they will rust.

After steam fitting will follow general plumbing. Plumbing ordinarily includes steam fitting, but also comprehends a great deal more. A knowledge of the principles and practice of plumbing is of very great value to anyone in any walk of life, and the trade of a plumber is of great and increasing importance. Should any of the Indian pupils manifest an aptitude and wish for this particular work, they should not be discouraged, for it offers to them a splendid field of labor and excellent opportunities for independent, self-supporting existence. On account of the remarkable skill with his hands inherited by the Indian,
the occupation of a plumber is peculiarly adapted to the Indian, and a number of Indian youths have already won commendable success in this line of work.

Those who undertake it as a life occupation will find it arduous and taxing all the skill of mind and hand, but they will be well repaid for their efforts and will also have the satisfaction of knowing that their work is a noble one. To the work of the plumber is due the great improvement in conditions of health in both country and city homes and the consequent lessening of sickness and reducing of the rate of mortality. Many years have been added to the average life by the improved drainage and increased cleanliness and resulting purification of the atmosphere of our cities and our homes.

Hence the first instruction to be given in this subject is that of natural drainage. Houses, especially farmhouses, should be located with the view of affording the best possible drainage. Show how such locations are to be selected and what conditions make a situation more or less desirable. The drainage of the school grounds will form an interesting illustration for study. Show in what ways the location of the school buildings is advantageous in this respect. Have the pupils examine the school farm and discuss the relative merits of various locations. Have each select the point best suited, in his opinion, for a home, and give his reasons.

Show how, by digging ditches, laying drain and soil pipes, and grading the ground near a building, the drainage may be improved.

Discuss the various means of dispensing with the dangerous cesspool in places where sewerage facilities are not available.

Endeavor to have a line of all kinds of pipe fittings, models, and samples of joints, closets, etc. The possession of these will render the work much easier and will serve to illustrate the various fittings upon which instruction is given. The student should become very proficient in pipe fitting. Teach how to make a solder; how to make a "wiped joint," which is used so universally in making lead-pipe connections; how to make a joint between lead and iron pipes, often so necessary in connecting up bath tubs, where lead and iron pipes must be joined, and how to make a "packed joint." Give as much practice as possible in setting up closets and bath tubs. Whatever repair work may be done around any of the buildings of the school should be utilized to give the pupils practical experience.

Give instruction in laying, first, water and then sewer pipes, and explain the difference in their joints and the manner of connecting them. Give practice in making connections with lead, showing the proper heat, etc. In cold districts water pipes must be provided with the proper protection, either by laying them sufficiently deep or giving them artificial protection, in order to prevent freezing. The proper grading of drainage pipes is important, and the students should
learn by practice the "fall" required under different conditions. Show how to avoid air pockets. Teach how to locate leaks and stoppages in water pipes; how to clean out water pipes, sewers, and drains; how to remove obstructions in closets; how to repair leaks temporarily by the use of hemp, plugs, and other means; how to thaw out frozen pipes, and how to repair temporarily a split pipe.

The different kinds of pipe: show when galvanized should be used and when other kinds; the best kinds of pipe for drains, sewers, etc.

Give instruction and practice in running iron soil pipes and making connections in oakum and lead; also in the proper location of drains and the testing of the drain system for leakages.

Give some instruction in the fitting of gas pipes.

We are indebted to Mr. J. S. Hill, chief engineer, Old General Post-Office Building, for the main part of this course of engineering, Mr. Hill having had wide experience as an engineer, also as a teacher of Indian children in this most important branch.
THE EVENING HOUR.

The superintendent must call upon all employees in the school to unite in making the evening sessions of the school pleasant as well as beneficial. This is a most excellent time for vocal music. A short time should be devoted every evening to note reading, the scales, part singing, and general chorus work. The patriotic songs must be taught in every school, and every child should be familiar with the words as well as the music of our inspiring national songs.

One evening in the week should be a social hour, when the pupils may spend the evening in conversation, grand marches, etc., under the direction of the teachers, who are expected to see that pupils conduct themselves as the sons and daughters in a well-regulated home under the care of the mother.

It is not advisable to have pupils study in the evening. Many schools do not have lights sufficiently bright to read by, and numbers of the children have weak eyes which should not be used at night any more than is necessary.

The superintendent will be able to plan for a pleasant and profitable hour for the pupils each evening by having the several employees give a talk on the work of their respective departments, arranging so that each employee will instruct the children at the evening hour twice a month, for example:

- Monday, the farmer.
- Tuesday, the seamstress.
- Wednesday, the shoe and harness maker.
- Thursday, the cook.
- Friday, the social hour.

Subjects and dates being changed to suit the convenience of the employees.

- Sunday, devotional exercises, song service, etc.
- Monday, the industrial teacher.
- Tuesday, the laundress.
- Wednesday, the matron.
- Thursday, the superintendent.
- Friday, social hour.

This will carry the work through two weeks, when it is to be repeated on through the year.
The class-room teacher will assist in making the evening hour a helpful one by preserving order and by assisting the speaker of the evening in every way possible, giving the instruction in music, in calisthenics, and in current events, etc.

A short exercise in calisthenics must be given every evening, giving the pupils breathing exercises and proper positions in standing and exercise in using the various muscles, improved health and grace of movement being the ends sought in this work. Some of the exercises may be given with music, which adds to the interest.

The hour should really be called the recreation hour, and after the work of the day is over the exercises of the evening should be of a restful, entertaining nature, that each child shall grasp a practical thought that may be applied in the work to be done.

All pupils over 9 years will be expected to attend the exercises of the evening hour.

The teachers of the different departments who are to give talks on their special work must arrange these talks so as to give the details of the work step by step.

The cook, in her talks throughout the year, will give menus for breakfast, dinner, and supper, for the different seasons, with recipes for making everything, which the pupils will take down; thus each school will make its own cookbook, while the pupils will learn to plan
ahead, and to have vegetables and fruits in season, carefully preserving and drying everything possible for winter use. This affords excellent chance for study of English and composition.

The matron's talks will include general housework, sweeping, keeping the corners clean, the necessity for keeping a clean house and a place for everything. The number and kind of garments needed for winter, also for summer; how to make them, launder them, and keep them well mended. How to prepare the meals for a small family, serve them daintily, and the importance of eating at regular intervals and not waiting too long, thus giving the heart too much work at one time, and the necessity for keeping the surroundings of the house in good order, as well as the interior. She will give talks on the special care of each room in the house, and through the whole warp of life to weave truthfulness, honesty of purpose, and integrity, that the result will be honest men and women and useful citizens. In like manner each subject presented must be given with the purpose of showing the pupils more clearly the reasons for doing the work in question.

In every school the salute to the flag must be taught, and where the climate will permit, this exercise must be engaged in out of doors, by the whole school, morning and evening; and where the climate is too severe, it can be done in the classroom daily and at the evening hour.
Lessons in gardening begin the first year the child is in school, when, with the class-room teacher, he goes out to the section of land set aside by the superintendent for the children's gardens and with the assistance of the teacher lays off the plot of ground for the garden, plants a rotation of crops, harvests them, and has a few pennies and considerable experience as a result of his first venture as a farmer.

The need for agriculture in the schools of the land is greatly felt, and in all sections the best schools are taking up the study, and not only giving practical work and work in the class room to the smaller children, but are establishing normal courses, that teachers may fit themselves to teach this most important subject in the best manner possible. The public schools in some localities are incorporating this subject in their course of study, and in some communities vacation is given the pupils in winter, so that the children may have an unbroken session during the months when gardening can best be carried on, that they may learn every stage of gardening operations from plowing the soil to marketing the products. In localities in England the sons and daughters of well-to-do people may be seen in the fields studying gardening in the most practical manner—by making gardens; and if people inheriting the skill of ancestors who have made the fields "blossom as the rose" for generations see the necessity for such training for their children, how much more important it is that the children of a race just starting on the road to civilization should learn how to get the most out of the land upon which they live. Thoughtful teachers in every section deplore the idle hours spent by the children in vacation days, and vacation schools for instruction in gardening, etc., are springing up everywhere. The agricultural teaching at the schools of Kirksville, Mo., as outlined by Mr. John R. Kirk, and at some of the universities of the country, at agricultural experiment stations, and the agricultural colleges of the different States, show the interest felt in the work by the people generally, and the impetus recently given the study proves the need for better agricultural study everywhere.
This illustration gives an excellent plan for a number of gardens, as laid off and successfully worked at the industrial school at Hampton Institute, Virginia, by the students from the kindergarten to the highest grade, under Prof. C. L. Goodrich, and is an excellent one to use at the Indian schools. It is intended to have two children at each plot or bed. The beds may be 4 by 6 feet, having a path 1 foot wide all around, and the following vegetables which may be planted will show the possibilities in the work.

The pupils at Hampton raise the following vegetables in the gardens:

- Radishes
- Turnips
- Beans
- Onions
- Melons
- Tomatoes
- Lettuce
- Beets
- Cabbage
- Corn
- Cucumbers

Spinach and kale may be planted in August for winter use.

Several crops of radishes may be raised during the season.

On the long, narrow beds where fruits are planted it is purposely planned to plant blackberries and raspberries or gooseberries in the center of the bed to serve as a hedge, keeping children working on each side of the bed from playing, as well as to teach the culture of the fruits in question. It is not expected that this rotation or even that these vegetables can be raised in all sections, since climatic conditions will make it necessary to plant crops that will yield the best results in the respective localities, but there is an opportunity for the teacher in charge to show her skill and ability to deal with existing conditions and to preserve the rotation in planting that the best
authorities have proven can be used in her special environment, and a
lesson of the greatest benefit to the children may be taught in each
school by showing pupils how to obtain the best results with the mate-
rial available and under conditions existing.

It is expected that teachers in the schools will put themselves in
communication with persons at the nearest agricultural experiment
station in order to know the very best crops to plant and rotations to
follow in their respective localities, and from time to time teachers
should apply to the Agricultural Department, at Washington, D. C.,
for the valuable bulletins issued there, which give the very best advice
on all agricultural subjects. It is expected that teachers will put forth
every effort to make this work a success and to cooperate with the
superintendent in his efforts to teach the Indian children to cultivate
their allotments and to become self-supporting.

GARDENING AND DAIRYING.

The work as outlined by Mr. Goodrich centers in the school garden,
and Mr. Goodrich says:

"The lessons in nature study are based on the work done there, that the
children may learn about the facts and principles which will be useful on the farm and home
garden. Every child must know the important parts of plants and
the use of these parts to man; how plants grow, and how to help the
plant to do its work; what the soil does for the plant, and how soils
are made; the work of the sun, water, air, ice, plants, and animals in
making soils, and the relation of the soil to water, air, heat, and
plant food; the insects found in the garden; their habits, what they eat,
and how to check the evils of injurious insects.

"Have a number of bottles containing water in which seeds of
corn, wheat, etc., are to be dropped at different intervals, showing the
pupils the progress seed makes sprouting at the end of three hours,
six hours, twelve hours, twenty-four hours, etc. Show how sprouting seeds need
moisture and air; that to sprout they need enough moisture to soak them through
and through, and that when we plant seeds we must prepare the soil for them and
so plant them that they will be able to get sufficient moisture to sprout."

64. Experiment.—Soak some beans twenty-four hours; carefully dry them. In one
half-pint bottle (labeled "B") place about a dozen of them and fill another bottle
(labeled "C") half full of them. Cork the bottles and let them stand for several
days; also let some beans remain soaking in water in a glass. The dozen beans in
bottle B will sprout, while the larger number in bottle C will not sprout, neither will
those in the water.

65. Why is this?
Experiment.—Carefully loosen the cork in bottle C, light a match, remove the cork from the bottle and introduce the lighted match. The match will stop burning as soon as it is held in the bottle, because there is no oxygen in the air of the bottle to keep the match burning. Test bottle B in the same way. What has become of the oxygen that was in the air of the bottles when the beans were put in them? The seeds have taken it because they need oxygen to help them sprout, but they have not sprouted so well in bottle C because there was not oxygen enough for so many seeds. The seeds in the water do not sprout because there is not enough air in the water to give these seeds the necessary oxygen.

66. Experiment.—Fill some tumblers with wet sand and others with clay that has been wet and then thoroughly stirred till it is about the consistency of cake batter or fresh-mixed mortar. Take a tumbler of the wet sand, one of the puddled clay, and plant two or three kernels of corn in each, pressing the kernels down one-half or three-fourths of an inch below the surface; cover the seeds and carefully smooth the surface. In other tumblers plant peas, beans, and other seeds. Cover the tumblers with saucers, pieces of glass, or board to keep the soil from drying. Watch them for several days. If the clay tends to dry and crack, moisten it, fill the cracks, and smooth the surface. The seeds in the sand will sprout, but those in the clay will not. (See fig. 16.) Why is this? Water fills the small spaces between the particles of clay and shuts out the air with its oxygen, which is necessary for the sprouting of the seeds.

67. This teaches us that when we plant seeds we must so prepare the soil and so plant the seeds that they will get enough air with oxygen to enable them to sprout.

68. Experiment.—Plant seeds of corn and beans in each of two boxes; set one box out of doors in a cool place and keep the other in a warm place in the house. The seeds kept in the house will sprout quickly, but those outside will be very slow, if they sprout at all. This shows us that heat helps seeds to sprout.

69. The seeds of farm crops may be divided into two classes, according to the temperatures at which they will germinate readily and can be safely planted.

a. Those seeds that will germinate at an average temperature of 45° in the shade:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasses.</td>
<td>Lettuce.</td>
<td>Spinach.</td>
</tr>
</tbody>
</table>

These can be planted with safety in spring as soon as the ground can be prepared, and some of them if planted in the fall survive during the winter.

b. Those seeds that will germinate at an average temperature of 60° in the shade:

<table>
<thead>
<tr>
<th>Alfalfa.</th>
<th>Pole bean.</th>
<th>Pumpkin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowpea.</td>
<td>String bean.</td>
<td>Tomato.</td>
</tr>
<tr>
<td>Soy bean.</td>
<td>Cucumber.</td>
<td>Pepper.</td>
</tr>
</tbody>
</table>

70. We are now ready to answer the question, "What conditions are necessary for seeds to sprout or germinate?" These conditions are:

a. The presence of enough moisture to keep the seed thoroughly soaked.

b. The presence of air with its oxygen.

c. The presence of more or less heat.

Then the farmer, the truck gardener, the flower gardener, and the window gardener must all so prepare their soil and so plant their seeds that the seeds will be able to obtain sufficient moisture, heat, and air.
Obtain samples of as many of the farm and garden seeds as possible. Put in small bottles. Arrange them in groups according to resemblances or relationships. For example:

The grass family:          Mustard family:          Nightshade family:
   Barley.                Brussels sprouts.           
   Sorghum.               Kale.                       
   Grasses.               Kohli rabi.                  
                          Horseradish.                 
                          Radish.                     
                          Ruta baga.                  
                          Turnip.                     
                          Watercress.                 

Gourd family:          Lily family:          Goosefoot family:
   Cucumber.             Leek.                       Spinach.        
   Muskmelon.           
   Pumpkin.             
   Squash.               
   Watermelon.          
   Cynlin.               

Parsley family:          Thistle family:          Pea or legume family:
   Carrot.               Cardoon.                    Canada field pea. 
   Coriander.           Dandelion.                   Soy bean.      
   Fennel.               Lettuce.                     Lima bean.     
                          Tansy.                        Clover.
                          Tarragon.                    Alfalfa.        

Have the pupils spend a period or more getting acquainted with the seeds and their relationships. It will be well to keep these seeds on the tables for several days. Show the use of the seed leaves of the corn, kernel, or parts of the pea, to the growing plant; that seeds must be planted deep to get sufficient moisture for sprouting, but not so deep that the young seedlings will be unable to force their way to the surface. Show that seeds that raise their cotyledons above the soil should not be planted as deep as those which do not. Strong seeds, like corn, peas, etc., can be safely planted at a depth of from 1 to 5 inches.

76. How deep should seeds be planted?—Experiment.—Make a very narrow box like fig. 18, having wood bottom and ends, but glass sides. The length and the depth of the box will depend upon the size of the glass you use. The inside width of the box should not be more than one-half to five-eighths of an inch.

Fill the box nearly full of coarse sand and plant seeds of corn and beans at depths of one-half inch, 2 inches, 5 inches. These seeds can best be put in as the box is being filled. Hold each individual seed against the glass with a stick, so that when planted they may be seen through the glass. After all are planted water thoroughly.
Protect the seeds and roots from the light by using a sheet of cardboard, tin, or
wrapping paper, and set in a warm place. Do not add any water after the first
wetting. Look at the seeds from day to day. The moisture will probably evaporate
from the upper part of the sand before the half-inch seeds get sufficient to sprout
them. The 2-inch deep seeds will probably come up all right. Of the 5-inch deep
seeds the corn will make its way to the surface. The beans will make a strong effort,
but will not succeed in forcing their way to the surface, and will finally give up the
struggle. This experiment teaches us that we should plant seeds deep enough to get
sufficient moisture for sprouting and yet not so deep that the young seedlings will not be able
to force their way to the surface.

Repeat this experiment with other soils and other seeds, or make several of the
boxes and start them all together.

77. Seeds which raise their cotyledons above the soil should not be planted as deep
as those which do not. Large, strong seeds like corn, peas, etc., which do not lift
their cotyledons above surface can be planted with safety at a depth of from 1 to 4
or 5 inches.

There is no gain in the greater depth unless the upper soil is lacking in
moisture, which the seed must have to germinate.

78. Can we, in planting, help the seed to get moisture?

Experiment.—Get a box
at least 6 inches deep and
that will hold at least half
a bushel of earth. Fill it
loosely with well-pulver-
ized, moist soil from the
field or garden. In one
side of the box plant corn
about half an inch deep,
covering it loosely with
soil. In the other side
plant corn the same depth,
but after planting press
the soil firmly over the
seeds. Set in a warm place and watch developments. The soil that was not pressed
after planting will very soon become dry on the surface and will gradually dry below
the seed, which will not come up, while the soil that was packed will continue to
keep moist and the seed will sprout. This is because packing the soil increases its
power to soak up the water from below and therefore the seed is kept moist enough
for sprouting. This teaches us that unless the soil in which we plant seeds is quite
moist we should press the soil over the planted seeds, and especially so in the dry summer
season.

Most of the small hand seed drills have rollers attached to them for pressing the
soil over the seeds. The large drills for sowing grain do not, and they should be fol-
lowed by a roller when conditions are proper.

79. Seeds of carrot, celery, parsley, parsnips, and egg plant are weak and rather
slow in germinating. It is customary to plant them rather thickly in order that by
the united strength of many seeds they may more readily come up to the surface.
This point should be observed also in planting seeds in heavy ground that is liable to
pack and crust over before the seed germinates.
SOWING SEEDS.

80. Seed should always be sown in freshly stirred soil, and may be planted by hand or with a machine.

For the home garden, and when only small quantities of any one variety are planted, as in test plots, the machine is hardly desirable and hand planting is preferable.

The rows are marked out with a garden marker, or the end of a hoe or rake handle, using a line or the edge of a board as a guide.

The seeds are then carefully and evenly dropped in the mark or furrow.

The covering is done with a rake or hoe, and the soil is firmed over the seeds by patting it with the covering tool or walking on the row and pressing it with the feet.

81. A convenient way of distributing small seeds, like turnip and cabbage, is to take a small pasteboard box or a tin spice or baking-powder box and punch a small hole in the bottom, near one end or side. Through this the seeds can be sifted quite evenly.

82. For the larger operations of the farm and market garden hand and horse-power drills and broadcasters are generally used, though some farmers still plant large fields by hand.

83. The grasses and clovers are generally broadcasted by hand or machine, and are then lightly harrowed, and, if conditions are proper, are rolled.

84. The small grains are broadcasted by many farmers, but drilling is considered better. With the grain drill the seed is deposited at a uniform depth and at regular intervals. In broadcasting some of the seeds are planted too deep, some too shallow, and others are left on the surface of the soil.

From experiment it has been found that there is a loss of 15 or 20 per cent of seed when broadcasted as compared with drilling.

As in the case of grass seed, the grains are rolled after sowing if conditions are proper for it.

85. Corn is planted by hand, or by hand and horse corn planters, which drop a certain number of seeds at any required distance in the row.

86. There are a number of drills made for planting vegetable seeds which are good machines.

The main points to be considered in seed drills are—

(1) Simplicity and durability of structure.
(2) Ease of draft.
(3) Uniformity in quantity of seed planted, and in the distances apart and depth to which they are planted.

87. The distances apart at which seeds are planted vary according to the character of the plant. Bushy, spreading plants require more room than tall, slender-growing plants.

88. Get together as many seed-sowing tools as possible and let the pupils see how they are constructed and how properly used. Give them as much practice with these tools as possible.

PREPARATION OF THE SOIL.

Having learned the conditions which are necessary for the sprouting of seeds and the growth and development of roots, we can intelligently discuss methods of working the soil to bring about these conditions.

Spading for planting.

89. The typical tool for preparing the soil is a spade or spading fork. The class should be taken out to see good spading done and given some practice. In spading, the spade or fork should be pushed into the soil the full length of the blade and
nearly straight down. The handle is then pulled back and the spadeful of earth is pried up lifted slightly, thrown a little forward, and at the same time turned. The lumps are then broken by striking them with the spade. All weeds and trash should be covered during the operation. A common fault of beginners is to put the spade in the soil at a slant and only about half the length of the blade, and then flop the soil over in the hole from whence it came.

In Europe and on some of the large estates in this country large areas of garden and nursery grounds are spaded.

90. During our excursion we saw farmers preparing their soil with plows, harrows, rollers, etc. In order to understand the proper use of these tools it will be well for us to study their structure and how to use them to the best advantage.

91. Plows and plowing.—If the school does not own a plow, borrow a good two-horse plow from a neighboring farmer, take it to the schoolroom and there study its parts, learn their names and their proper use or office.

92. It will be found that a good plow has the following parts:

a. A standard or stock (fig. 20), the central part of the plow, to which many of the other parts are attached.

b. A beam, by which the plow is drawn. Some plows have wooden beams and others have iron beams.

c. Handles, by which the plow is guided.

d. A clevis, which is attached to the end of the beam and is used to regulate the depth of plowing. To make the plow run deep the ring is placed in the upper holes of the clevis; to make the plow run shallow the ring is placed in the lower holes. The clevis is also used to regulate the width of the furrow slice. By moving the clevis to the right, the plow is made to cut a wider furrow. Some plows have a double clevis so that the draft ring may be raised or lowered or moved to the right or left. With some plows the width of the furrow is adjusted by moving the beam at its attachment to the handles.

e. A share, which cuts the bottom of the furrow slice.

f. A moldboard, which turns and breaks the furrow slice.

g. A landside, which keeps the plow in place.

h. Some plows have a coulter, which is fastened to the beam just in front of the moldboard and serves to cut the furrow slice from the land. The coulter is sometimes made like a sharp revolving disk. This form is very useful in turning under vines and tall weeds.

i. A jointer, or skimmer, which skims stubble and grass from the surface of the soil and throws them into the bottom of the furrow, where they are completely covered. The jointer helps also to pulverize the soil.

j. A truck, or wheel, attached to the end of the beam. This truck makes the plow run steadier, and also lightens the draft.

93. Characteristics of a good plow.

A good plow should be strong in build and light in weight.
The draft should be as easy as possible.
The plow should run steadily and at a uniform depth.
A good plow should not only turn the soil but pulverize it as well.
When plowing, the plow should be so adjusted that it will cut furrows of the required width and thickness with the least draft on the team and the least exertion on the part of the plowman.

94. Why do we plow?

a. To break and pulverize the soil and make it soft and mellow, so the roots of plants may enter it in search of food, and get a firm hold for the support of the plant which is above ground.

b. To make the soil open and porous, so that it can more readily absorb rain as it falls on the surface.

c. To admit air to the roots of plants. Also to allow air to act chemically on the mineral and organic matter of the soil and make them available to the crop.

d. To raise the temperature of soils in the spring, or of damp soils any time.

e. To mix manures with the soil. The more thoroughly manure is distributed through the soil the more easily plants will get it and the greater will be its indirect effect on the soil.

f. To destroy the insect enemies of the plant by turning them up to the frost and the birds.

g. To kill weeds. Weeds injure crops—

(1) By occupying the soil and thereby crowding and shading the crop.

(2) They draw moisture from the soil which should be kept for the crop.

(3) They take plant food from the crop.

h. The operation of plowing tends to bring about the conditions necessary for the important process of nitrification.

i. The germinating seed requires moisture to dissolve plant food stored within it, a gentle warmth, and the presence of oxygen from the air to assist in the chemical changes which take place.

After germination the rootlets of the growing plant need a soil that is soft, mellow, and firm; a supply of moisture and air necessary to prepare plant food.

These conditions are brought about through plowing and preparation of the soil.

95. Professor Roberts, of Cornell, says:

"All of the objects which may be secured by plowing are seldom or never kept in view. Hence in America it is less understood and most imperfectly performed of any operation of preparing the land for crops. It is still worse in Europe. The Englishman does little more than two things with the plow—inverts the furrow and makes it straight."

96. When should land be plowed?

The time of plowing depends largely on the nature of the soil, climate, and crop.

More plowing is done in the spring just before planting spring and summer crops than at any other time, excepting the localities that plant large areas of grain and truck.

97. Spring plowing leaves the ground fresh and moist for germinating seeds and the roots of plants, and lessens the risk of loss of plant food by fall and winter rains. In cold climates, where the ground freezes, this risk is not so great as in the warmer regions. Spring plowing should be done as early as possible to produce the best effects.

98. Fall plowing. There are special advantages to be gained by fall plowing, particularly in heavy soils:

a. Immediately after harvest the land is usually dry and easy to work.

b. The soil plowed at this time and left rough is acted upon physically by the frost, which pulverizes it, and chemically by rain and air, which render available as plant food inert mineral and vegetable matter.

c. Insects are turned up and exposed to frost and birds.

d. A great number of weeds are destroyed and the land is easily put in condition for crops the following year. Fall plowing should be done as early as possible.

99. Bare fallow.
The land is often plowed and allowed to lie without a crop for some time. This is called bare fallowing the land.

Bare fallow should not be practiced on all soils. It is adapted—

a. To dry climates where plant food will not be washed out of the exposed soils by rains.

b. To heavy clay lands.

c. To land that is foul with weeds and insects.

d. To sour soils which are sweetened by exposure to air and rain.

100. Light soils should not be subjected to bare fallow. They should always be covered with a crop to prevent loss of plant food by leaching.

101. How deep shall we plow?

We learned in a previous lesson that the roots of farm plants develop largely in that part of the soil which is worked by the plow; therefore, to have as much tilled soil as possible for root growth, we should generally plow as deep as possible without turning too much of the subsoil to the surface. Lands that have not been plowed deep should be deepened gradually by plowing up a half inch to an inch of subsoil each year until the plow reaches a depth of at least 9 or 10 inches.

102. There is an opinion among many farmers that sandy soils should not be plowed deep, but as these soils are apt to be leachy it seems best to fill them with organic material to as great a depth as possible, and this can only be done by plowing farm manures in deep.

103. It is not best to plow land that is wet or land that is very dry, unless it be very light soil.

If heavy soil is plowed when wet it dries out in great clods, which interfere with further operations, and it generally takes a season or more to get a cloddy piece of land back to its original condition.

104. The furrow slice.

a. In plowing, the furrow slice may be cut thin and wide and be turned over flat.

b. It may be cut thick and narrow and be turned up on edge.

c. Or it may be cut of such width and depth that the plow will turn it at an angle of 45°.

By the last method the greatest amount of soil can be turned at least expense of labor, the furrow slice is more thoroughly broken, the greatest surface is exposed to the action of the air, and plant food is more evenly distributed through the soil.

105. **Breaking out the middles.**

Some farmers have a way, when getting land ready for a crop, of plowing the rows first and then "breaking out the middles," or spaces between, after the crop is planted. This is a poor practice, as it interferes with thorough preparation of the soil. The ground can be more thoroughly plowed and broken up before the crop is planted than afterwards. This practice of leaving the middles interferes with proper harrowing and after cultivation.

After studying the plow the class should be taken to the field to see good plowing done, attention being called to the work of each part of the plow.

106. **Harrowing.**

After plowing, the next operation in the preparation of the soil for a crop is generally harrowing or dragging. The objects of harrowing are—

a. To break lumps and clods left by the plow and to further pulverize the soil.

b. To bring about conditions favorable to a more even distribution of seed.

c. To destroy weeds.

d. Harrowing aids in ventilating the soil by making it fine and porous, and puts it in a better condition to absorb moisture.

e. It prevents the loss of moisture by making a mulch of fine earth on the surface.

f. The harrow is also the tool generally used for covering seeds that have been sown broadcast.
107. Time to harrow.

Harrowing is generally done just before planting, and with some crops just after, to cover the seed or smooth the ground. Harrowing is also done during the first stages of the growth of some crops to kill sprouting weeds and to make a soil mulch. The harrow should always follow the plow unless it is desired to leave the land in a bare fall or winter fallow. At other times of the year the lumps of earth are apt to dry out and become hard and difficult to break.

108. Harrows.

There are several kinds of harrows in use, which may be classified according to the style of their teeth or cutting parts. They are as follows:

a. Rolling-cutter harrows.
b. Spring-toothed harrows.
c. Spike-toothed harrows.
d. Coulter-toothed harrows.
e. Chain harrows.
f. Brush harrows.
g. Plank or drag harrows.

These types vary in the depth to which they cut and the degree to which they pulverize the soil.


Harrow of this type (see fig. 21) consist of one or more revolving shafts on which are arranged a number of concave disks. These disks are either entire, notched, or made of several pieces laid together. Examples of these are the disk, cutaway, and spading harrows. These harrows cut and move the soil deeper than the other types. They are especially adapted to work on heavy clay soils.

The value of this type of harrow as moisture preservers depends on the manner in which they are used. If the disks are so set that they cover but a portion of the surface with the mulch of fine earth they leave a ridge exposed to the action of the wind and sun and the rate of evaporation is greatly increased. The disks should be set at such an angle that the whole surface shall be stirred or covered. Soils which need the disk harrow should generally be gone over again with some shallower working tool. An objection to the rolling cutters is that unless great care is taken they will leave the land in ridges and valleys.

The two gangs of disks throw the earth in opposite directions. They are generally set to throw it from the center, and the result is a shallow double furrow the width of the machine. By turning each time the furrow is partially filled, but to get the land smooth and level, a smoothing harrow must be used after the rolling cutter.

110. Spring-toothed harrows.

Spring-toothed harrows (see fig. 22), with their curved teeth, enter the soil readily, draw moderately easy, and pass over obstructions without much difficulty. They pulverize the soil to an average degree and to an average depth. In action they are
similar to a cultivator. They leave the soil in ridges and more compact than do the rolling cutters. The ridges can be leveled by a smoother in the shape of a piece of plank attached to the rear of the harrow. On newly plowed grass land they tend to tear up the sod. They make good cultivators after the crop is up. The original and more common form of the spring-toothed harrow is a floating harrow when at work; that is, it rests on the points of the teeth and is dragged or floated over the ground. A newer form of spring-toothed harrow, sometimes called the fallow cultivator, is mounted on high wheels and its action is largely controlled by them. This form of harrow is claimed to do much better work than the floating harrow and may in a large measure displace the rolling cutter. The weight of this

harrow is entirely taken from the soil except in the wheel tracks, and the entire action is pulverizing and lightening the soil.

111. Spike-toothed harrows.

The teeth of these harrows (see fig. 23) are round, square, or diamond-shaped spikes fastened into a wood or iron frame. The teeth are set in a vertical position or are inclined to the rear. These harrows are shallow in their action; they run easily, but tend to compact the soil more than the other types, and are therefore better adapted to loose soils and to finishing off after the work of the deep-cutting harrows. They are also used for covering seeds.

112. Coulter-toothed harrows.

The coulter-toothed harrows (see fig. 24) have teeth resembling the coulter of a plow twisted or bent into various shapes. The Acme is a good example of this class of harrow. It cuts, turns, and pulverizes the surface soil somewhat after the manner of a plow. It prepares a fine mulch and leaves an excellent seed bed. It is an excellent harrow to finish off with after using the rolling cutter.

113. Chain harrows.

The chain harrow consists of a web of chains linked together. They have a wonderful power for breaking clods, and are useful for collecting weeds. They shake the dirt from the weeds and roll them into heaps. Chain harrows tend to compact the soil.

114. Brush harrows.

The brush harrow is a primitive form made by fastening brush to a long pole. Brush harrows are quite useful for brushing in seed and for pulverizing manure broadcasted on grass lands.
115. **Plank harrows.**

The plank harrow (see fig. 25) is made of several planks fastened together so that each plank overlaps the next one to it, like the clapboards of a house. This harrow is almost as good as a roller in fining and smoothing the surface soil.

116. **Rolling.**

Rolling is a process of compressing the soil and breaking clods with a roller; the objects of rolling are:

a. To compress the surface soil so that the harrow will do its work more efficiently, also to break small clods or lumps that may have resisted the action of the harrow.

b. To smooth the surface of the soil for an even distribution of fine seeds and by pulverizing and packing the ground make it firm and close around such seeds that they will sprout readily.

c. To press into the ground the roots of plants partly dislodged by the frost.

d. To give compactness to soils that are light and loose and thus enable them to hold moisture and plant food better.

e. To remove the conditions favorable to the development of many kinds of insects.

f. To sink surface stones so that they will not interfere with harvesting the crop.

117. **Time for rolling.**

Light porous soils may be rolled whenever the requirements of cultivation may demand it. But clay soils can be rolled to advantage only when they are stiff and cloddy.

Spring grain in ordinary weather should be rolled as soon as it is sown, but in time of wet weather the rolling should be deferred until the grain is above the ground. In the first case quick sprouting is assisted, and in the second the formation of a crust is avoided. Autumn-sown grain should not be rolled after sowing unless the season is very dry, lest fall rains pack the soil and smother the seed. As the roller compresses the soil together, capillary action is increased and moisture is brought to the surface. If care is not taken the land will be deprived of moisture by increasing evaporation. This should be guarded against when possible by forming with a harrow a light mulch on the surface. Clay lands should not be rolled when wet.

118. There are many forms of rollers. The most simple is the wooden roller, which is simply a cylinder of wood attached to a frame, by which it is drawn. Some rollers have attached to their surfaces spikes or blunt attachments for breaking clods.

119. If the school does not own a harrow or roller, get together as large a collection as possible from the neighboring farmers. Let the pupils study these and get some good farmer near by to put them into use for class observation.

120. **Ridding the land.**

Planting on beds or ridges is more a question of drainage and temperature than of soil or crop. When land is thrown into ridges a greater amount of surface is exposed and a greater evaporation of moisture takes place, therefore ridge culture is more wasteful of soil moisture than level culture. For this reason dry soils everywhere, and most soils in dry climates, should, whenever practicable, be left flat. On stiff, heavy soils, on low bottom lands and during wet seasons it may become desirable to ridge the land for some crops. The practice of ridging is an old custom handed down from prehistoric times when Europe was an immense swamp covered with forests. An early writer tells us that to get rid of the water the land was ridged and some of the ridges were so high that a horseman riding in the ditch on one side could barely see his companion riding on the other side of the ridges. These ridges were from 24 to 100 feet wide. This custom of ridging has been handed down, and we find farmers ridging even the lightest of lands in the driest of seasons, having forgotten or never stopping to think out the reason for such practice.
121. We find in an earlier lesson that all of our farm plants have roots, stems, leaves, etc. We have studied the root first as being the most important part of the plant. The leaf is the next most important part and is the part next to be studied. Have the pupils bring specimens of branches of leaves of several kinds. At class time ask the pupils to tell something about these leaves, and as the answers come write the following particular ones on the board:

They are all green.
They are flat and thin.
Many are very broad.
Some have stems.
Some of the leaves on a single branch are larger than others on the same branch, and some have longer stems than others.

122. What are the reasons for these facts?
A study of the uses of the leaves to the plant will probably help us to answer this question.

123. Experiment (see fig. 26).—Take a pot in which a young plant is growing, also a piece of pasteboard large enough to cover the top of the pot; cut a slit from the edge to the center of the board, then place it on the top of the pot, letting the plant enter the slit. Now close the slit with wax or tallow, making it perfectly tight about the stem. If the plant is not too large, invert a tumbler over it, letting the edge of the tumbler rest on the edge of the board; if a tumbler is not large enough, use a glass jar. If a potted plant is not convenient, a slip or a seedling bean or pea placed in a tumbler of water will serve the purpose. Prepare several and place some in a sunny window and leave others in the room where it is darker, and observe them from time to time. Moisture will be seen collecting on the inner surface of the tumbler. Where does this come from? It is absorbed by the roots and is sent with its load of dissolved plant food up through the stems to the leaves. There most of the water is passed from the leaves to the air and is condensed on the sides of the glass. A function of the leaf, then, is to throw off or transpire moisture and thus make room for a new supply of food-laden moisture. This water is thrown off through little pores or mouths or stomata which are very small and very numerous on the underside of the leaf. It will be noticed that the plant not placed in the sunlight transpires very little moisture, showing that sunlight helps the leaf in this work of transpiration.

124. How much water does a plant transpire or throw off from its leaves?

Experiment (see fig. 27).—Fill a common quart fruit jar or can with soil and plant in it a kernel of corn, a bean, a cotton seed, or seed of some other plant. After the plant has grown to be 12 or 15 inches high, cut a piece of pasteboard a little larger than the top of the jar, cut a hole in the center as large as the stem of the plant, and make a slit from edge to center. Soak the pasteboard in melted wax candle. Cool it and then place it over the jar, slipping it around the plant stem. Now invert the jar and solder the pasteboard to it with melted wax, making this joint tight all the way around. Now place the jar right side up and close up the slit and the hole about
the stem with wax. The jar is now completely sealed and there is no way for water to escape except through the plant. The plant should be well watered before the jar is closed. Now weigh the jar and set aside. Weigh again the next day. The difference in the two weights will represent the amount of the water used by the plant. The weighings may be repeated until moisture gives out. If it is desired to continue this experiment some time, a small hole should be cut in the pasteboard before it is fastened to the jar. This hole is for adding water to the jar from time to time. The hole should be kept closed with a cork. The amount of water added should always be weighed and account taken of it in the following weighings.

125. It has been found that the amount of water necessary to grow a plant to maturity is equal to from 300 to 500 times the weight of the plant when dry.

126. Experiment.—Take a few leaves of the common silver-leaved geranium that has been growing in the sunlight. Boil them for a few minutes to soften the tissues, then place them in alcohol for a day or until the green coloring matter is extracted by the alcohol. Wash the leaves and put them in a weak solution of iodine. The leaf will be seen to gradually darken where it was green before. This color will continue until it becomes a dark purple or almost black. We have already learned that iodine turns starch this color, so we conclude that the leaf must contain starch. If the silver-leaf geranium is not at hand, any variegated leaf which is partly white will do.

127. Experiment.—If there are plants growing in the schoolroom, have the pupils paste some pieces of paper about one-half inch square on the upper surfaces of some of the leaves of these plants; then set the plants in a sunny window. If the plants are not at hand in the schoolroom, then paste the paper on the leaves of plants out of doors, in the garden or field. The next day, during the latter part of the morning or during the afternoon, pick these leaves before the sun leaves them. Then boil them, treat with alcohol, wash, and treat with iodine as in the above experiment. The paper will, of course, come off when the leaves are boiled, and it will be found that the iodine will color the entire leaf except that part which was under the piece of paper, showing that there is starch in every part of the leaf that was reached by the sunlight, and but very little, if any, where the paper kept the sunlight from the leaf.

128. Experiment.—Gather some leaves from some plant during the sunny part of the afternoon and again early the next morning before the sunlight reaches the leaves. Treat these leaves as in the other experiments, namely, boil, soak in alcohol till the green coloring matter is removed, wash, and then treat with the weak iodine. It will be found that the leaves collected during the afternoon will be well filled with starch, but those collected early in the morning will contain little, if any, starch.

129. According to the last three experiments, leaves contain starch at certain times, and this starch seems to appear when the leaf receives sunlight and to disappear when the light is cut off. The fact is that the leaf manufactures starch in the light. This starch is then carried by the sap in the leaf to other parts of the plant and is there built into plant tissue or stored for future use. In the case of the variegated leaf we found the starch only where there was green coloring matter in the leaf. This green coloring matter, or chlorophyll as it is called, has something to do with the making of this starch; in fact, starch is only made where it is present.

130. What is this starch made from? We are told that it is made from carbonic-acid gas and water. The gas exists in the air and enters the leaf through little pores in the under side. After entering the leaf the green coloring matter, with the aid of the sun, breaks up the carbonic-acid gas, takes the carbon from it, and out of the carbon and the water which has been sent up by the roots it manufactures starch. The oxygen of the carbonic-acid gas is set free and passes out of the leaf pores into the air again.
131. **Experiment.**—The escape of this oxygen may be shown by taking some green sea lettuce or other green seaweed and placing it in a glass jar of sea water, then set the jar in the sunlight, and after a time bubbles of gas will be seen collecting and rising to the surface. This gas is oxygen set free from carbonic-acid gas taken from the water. If the seaweed is not at hand, almost any green fresh-water weed that grows beneath the surface will do.

All of the food of the plant, whether taken from the air or from the soil, is digested in the leaves, and sunlight and air are necessary for this work. Another function of the leaves, then, is to digest the food of the plant.

132. We are now ready to answer the questions, Why are leaves green? Why are they thin, flat, and broad? Why have some stems? Why are some larger than others on the same plants?

The leaves are undoubtedly green because the green coloring matter is necessary to digest the food of the plant.

They are flat and thin and broad because this form presents a large amount of surface to the sun; it also provides for a large number of pores through which carbonic acid may be taken in, and from which large amounts of water may be transpired.

The larger and longer stemmed leaves are undoubtedly those which had a better chance to get food, light, and air, and therefore had a better chance to grow.

133. **Care of the leaves.**—In planting we should take care that the plants are given enough room so that the leaves may receive sufficient sunlight and air to enable them to properly do their work for the plant. We should also see to it that the leaves are not injured or destroyed by insects or disease.

**STEMS.**

134. What is the habit of growth of stems?

**Excursion.**—Visit the farm and examine the stems of plants with reference to their method of growth.

Find stems that grow erect; for example, corn, pine tree.
Find stems that creep on the ground; for example, melon, sweet potatoes.
Find stems that climb; for example, grape, trumpet flower.
Find stems that twine; for example, bean, morning glory.
Find stems that are under ground; for example, white potato.

135. Compare stems with roots.

What does the stem do for the plant?

By observation we find that (a) stems support the leaves, flowers, and fruit of the plant.

136. **Experiment.**—Pour about an inch of water in a tumbler, color this water with a few drops of red ink (any other color will do as well), place in the colored water the ends of several twigs of trees and soft green plants. Observe for a day or two. The colored water will rise through the twig and will appear at the upper end. If the leaves are left on the stem, the colored water will appear in the veins and tissues.

137. In this manner the (b) stem carries plant food dissolved in water from the roots to the leaves, and after the leaves have digested it carries it back to various parts of the plant.

138. **Experiment.**—Examine the underground stem of the white potato, find it very much thickened; test with iodine and find starch.

This starch (c) is stored food for the future use of the plant.

139. Annual plants, or those which live but one year, store food in their stems and leaves during the early part of their growth. During the fruiting or seed-forming season this food material is transferred to the seeds and there stored, and the stems become woody. This is a fact to bear in mind in connection with the harvesting of hay or other fodder crops. If we let the grass stand until the seeds form in the head, the stem and leaves send their nourishment to the seeds and become woody and of less value than if cut before the seeds are fully formed.
In plants of more than one year's growth the stored food is used to give the plant a start the following season, or for seed production.

**FLOWERS.**

140. A good time to study the flowers is in the spring, when large numbers of fruit and other trees and plants are putting forth their flowers.

141. For a very brief study of the parts of a flower, suppose we take a peach blossom. (See fig. 28.) We will find that it has the following parts: An outer and under part called the calyx (b). In most plants the calyx is green. When the calyx is divided into several parts, these parts are called sepals.

142. Above the calyx is a broad, spreading part, brightly colored, and divided into several distinct parts. This is called the corolla (a) and its parts are called petals.

143. Within the corolla are found several bodies having long, slender stems with knobs on the top. These are called stamens (c); the stems are called filaments, and the knobs anthers. Within the anthers will be found a yellow powder called pollen.

144. In the very center of the flower will be found an upright slender body, called the pistil (d). This consists of three parts. The lower rounded and somewhat swollen part is called the ovary; the slender stem arising from it is called the style, and the slight enlargement at the top of the style is called the stigma. Within the ovary is a little body called an ovule, which develops into a seed.

145. Before the seed will develop, the pistil must be fertilized by pollen falling on the stigma.

146. The work of the flower, then, is to produce seed. The seed with its coverings is called the fruit of the plant.

147. The parts of flowers vary in number, size, shape, and arrangement. This will be readily seen by comparing the flowers of several different plants.

148. In the flowers of some plants certain parts will be lacking. For example, some of the flowers of the melon, cucumber, and squash have pistils and no stamens, while others have stamens and no pistils. With these plants it is necessary that the pollen be carried from the staminate flowers to the pistils by insects before they will produce fruit.

149. The flowers of some varieties of strawberries have very many pistils but very few stamens, and there is not enough pollen to fertilize the pistils, and for this reason such a variety planted by itself is often unfruitful. If we wish to be sure of such varieties fruiting, we must plant near them varieties which produce large amounts of pollen, or staminate varieties.

1. During the winter overhaul the farming implements and tools, and see that all are in good repair.

2. When farm implements are put away in the fall, they should be thoroughly cleaned and oiled and put under cover, where they will not get wet and rusty.

3. Make the hotbed in the fall; no garden is complete without it. See that all fences are mended, and have everything ready, so as to lose no time when spring opens.
GEOGRAPHY.

PREFACE.

Begin the subject of geography by studying the school grounds, their general character, and what they represent; the geographical formations they exhibit, and what they illustrate.

Teach the cardinal points, fixing them in the children's minds by connecting them with the positions of the different buildings and conspicuous objects in the vicinity. Likewise show their connection with the rising and setting of the sun, the direction of shadows, and the position of the bright north star, which will easily be found by anyone who has been shown the location of the Great Dipper. This study of directions will be the central and starting point for a great field of geographical study. Lead the children to discover the difference in temperature on the north and south sides of a building, and the causes of this; its effect upon garden making and farming. Show the causes of difference in temperature between northern and southern winds. Ask the children to notice the trees and shrubs and observe whether there is any disparity between the northern and southern sides of the tree or shrub; the significance of this.

Have the pupils draw a plan of the school farm, locating all the buildings, and giving their relative positions, using the school buildings as a starting point. Have them also locate the roads and fences and the different fields.

All industries (mills, foundries, manufactories, etc.) near the school should be studied carefully. All buildings and houses in the vicinity should also be considered, their location discussed, the work carried on there brought out, and their peculiarities noted. Compare houses and their advantages over one another. Plan for the future for the children, helping them map out the locations, features, and points they wish to emphasize in the homes they will plan for themselves.

Study the effect of the climate in the respective locality, noting the condition of the fields at all seasons and at different times in each season and the work that can be done in them from time to time. In studying the earth as the home of man, the real importance of the earth to man in giving him his living can not be too strongly emphasized, and the child must be led to think deeply on the subject as to how he can deal with the earth that it may yield him its best increase.
He should be impressed early with the advisability of planning to carefully cultivate his land so as to bring it up to the highest state of perfection, thinking of the different things he can raise on it and the number of crops he can take off each year, realizing that each crop means so much money, and that time and energy spent on the cultivation pays him in actual cash. This will be led up to step by step, beginning with gardens where only a few vegetables are raised in the first year.

At schools among basket-weaving tribes the materials required for making baskets should be planted and the growth carefully watched by the children.

Correlate with other work by showing what ingredients the different crops take from the soil and what they give to us when we eat them, and the use of these elements in building up strong healthy bodies and sound minds.

Compare the industries of the Indians as a tribe with those of the white people around them, and also consider and discuss the work that the children hear of in their homes as having been carried on in the past. For example, in the tribes of potters, criticise the work and see just what it lacks for utilitarian purposes, and seek, not to take the industry from the Indians, but so to improve its lasting qualities that the Indian can continue to pursue the native art, and with the help of improved methods, make his wares serviceable, stronger, and better, and hence marketable. Compare impartially all work done at home with that done in the school. Do not criticise the Indian for what he does, but show him how to compare his way of procedure with yours. If his work is better, give him the credit; if you see wherein his work can be made more effective, show him how in a spirit of helpfulness, and the result will be mutual benefit. We do not wish to make the Indian give up any of the useful and profitable industries he has been practicing for generations, but to show him the needs of civilization and how to adapt his work to the needs of the hour.

At the sand table have the school grounds laid out in relief, reproducing the geographical formations as accurately as possible, and making the school buildings of clay, twigs, or paper. In many cases this will be of such a character as to give the worker a practical idea of the different formations and divisions into which land and water are divided. When making a relief of any field or part of the reservation, see that the streams are represented to flow in the proper direction. In placing buildings on the sand table, have them face as they actually do on the ground. In studying roads, show how they were paths first, and later became roads.

Compare size of school yard with one of the larger fields; compare the school garden with the yard; compare the whole school farm with the reservation.
Lead the children to observe the phenomena of nature—day and night; bright and cloudy days; rain and snow; hail, frost, and dew—giving these in a series of talks, the substance of which may be written on the board, forming the reading lesson of the day. The seasons will furnish topics for further talks and lessons in geography. Show their influence upon man and beast, upon nature in general, upon vegetation, and upon the gardens in particular. Also take up light, heat, air, and water, and what they do for us. In the same way explain the causes of winds and their benefit to man.

Talks should be frequent on how the sun and rains influence vegetation, and how absolutely necessary they are to good crops, and why people have to dig ditches to carry water from streams and reservoirs in order to water their farms, and that this is called irrigation.

Consider likewise man's dependence upon the land for his daily bread; how the fields must be plowed, prepared, and planted by man, watered by rain or by irrigation, and cultivated carefully that they may yield an abundant harvest; also how the corn or wheat, after going through several processes, which should be explained step by step, is used to make bread. This lesson could be impressed, as well as a very useful lesson taught (which every boy and girl should learn), by having a series of lessons in bread making in the class room, the pupils taking part, until all have thoroughly mastered the art of making good bread. The wheat that is not needed to supply the demands of the table for the family must be sold to purchase other necessities. We are dependent upon the earth for meat also, since cattle must find their food from the fields in the summer and from hay and grains harvested and put away for use in winter. Thus the home of man rests on the earth, he walks on its face, and his living comes from it, and therefore the study of the earth is one to which he should devote careful attention.

Endeavor to give the pupils a thorough understanding of the geography of the reservation, and during the course have each one draw a map of it, showing its streams, lakes, mountains, roads, and other important features. Show the value of the streams to the prosperity of the reservation. Go thoroughly into the subject of the character of the soil, the climate, what can be raised in the different parts of the reservation. what should be planted on the hillsides and why, what on the river-bottom lands, on the prairie, what minerals are to be found, the value of the woods, if any, etc. Note on the map the location of each house on the reservation, and study carefully the conditions existing there, discussing the favorable and unfavorable points and how they might have been bettered. Explain how farms should be advantageously located near highways and streams, if possible, and likewise as to houses and how they may be so placed as to be protected from winds, etc. The idea must be kept before the child that
his land is one day to be his home after he leaves school, and he must be made to feel its value and his energies directed to understanding its conditions and situation geographically. Have the pupils trace out on their maps the chief routes from their homes to the nearest markets, and consider the crops that can most advantageously be raised, looking at the question both from the point of view of their adaptability to the climate and soil and that of the prices they will bring in the available markets.

The conditions are widely divergent in different sections of the country, and the geography presented to the pupils must be that of their environment. While agriculture will be the chief industry in most parts of the United States, and farming and farm products will form the chief center of the lessons in geography, yet there are sections where other occupations take first place, as, for instance, mining in some mountainous regions, lumbering in some districts of the north, herding and grazing in other localities, while in the extreme northwest fishing will engage the attention of many families and form their main pursuit. The teacher must adapt his work to the locality in which he is teaching, or where the pupils live, always remembering that it is the geography of the home that must form the principal lesson.

The importance of stock raising and dairying can not be taught too early. The children must know how necessary it is for stock to have a wide range and good water. Fields that are often unfit for cultivation afford excellent pasture for stock. The stock must be carefully branded and looked after, and fences and gates must be kept in good repair. Study the local conditions, and if stock raising can be conducted more advantageously than farming the children must be lead to see this and instructed at the school in the very best methods of accomplishing this.

Where possible dairying should also be an industry. The children will be given the first steps in this work in the kindergarten, where the teacher will give talks on the importance of the industry, and later the children will be taken to the dairy that they may learn the successive steps, milking the cow, putting the milk away in clean vessels, skimming the cream, churning the butter, and finally enjoying a lunch of the milk and nice bread and butter which they have made themselves.

Where there is but little rainfall and no water supply with which to irrigate, the crops must be such as will thrive and mature without much rain, and the method of dry-weather farming must be carefully and thoroughly taught, for by this plan the greatest possible proportion of the moisture is retained in the soil for the use of the crops.

The geography of the reservation will lead up to that of the State, which will be gone into with much less detail than that of the reservation. Have the children draw the map of the State and from this
teach the location, size, and features of the principal cities, the markets they afford for Indian products, etc. Study the transportation facilities to these cities and how they render any particular kind of industry on the reservation more valuable and profitable.

The products of the State must be carefully looked into, as giving an indication of what is best for the Indians to endeavor to produce. Agricultural, mineral, dairy, and forest products will be the chief classes under this head.

Study the natural features of the country, as the lakes, the very large rivers, and the great valleys and plains, especially those near home.

It is highly important that the pupils devote their time to studying what articles of consumption and commerce can be successfully and most profitably produced in the locality of their home, whereby they may become independent, rather than to occupy a vastly greater amount of time and energy in studying the products, customs, and characteristics of innumerable races and nations situated on the other side of the world, the familiarity with and knowledge of which can not in the slightest add to the happiness or prosperity of the Indian at the present stage of his development.

In everything that is studied impress this lesson continually, that the measure of the success of an individual or community or nation is the extent to which they have made this earth a better place for man to have his home. In studying or reading about any place or country, emphasize this point and impress upon the pupils the duty they owe the world. Compare the condition of the world centuries ago with the comforts, conveniences, and advantages of the present. Impress upon them that if each one labors to obtain a good home, be self supporting and independent, and endeavors to improve it and ameliorate the condition of those around him he will have discharged the duty which he owes to mankind and be a credit to his country and his race.

FIRST, SECOND, AND THIRD YEARS.

Every morning the teacher should question the children as to the day of the week, the month, and the year; also as to the climatic conditions. Keep a weather chart each day showing the amount of sunshine, rain, snow, etc., the direction of the wind, and everything of interest connected with the day. Correlate with number and language, this being an excellent way to teach English to small children. Do not allow the children to use monosyllables, but have every answer expressed in complete sentences. Use the yard, sand table, blackboard, paper, and pencils freely. Reproduce the natural features of the school grounds. Drawings must also be made to measurements of the schoolroom and other rooms in the different buildings, the
barns, stables, shops, etc. Drawings must also be made of the school grounds, each field, and of the reservation, that the children may have a complete understanding of the geography of the school surroundings.

Show the children that wind is air in motion; also that the air is heated by the sun.

Explain that steam from the kettle is a cloud that is made up of very little drops of water. Hold a piece of glass against the steam and see the moisture on the glass. The cloud of steam stays but a minute, then disappears into the air. We see the moisture in the air and call it clouds. When clouds settle close upon the land, we call it fog. When they become so heavy that they can not float, they fall and we call it rain. When the moisture freezes up in the clouds and falls in flakes, we call it snow. Sometimes the wind blows the snowflakes around and rolls them together into little balls, which partly melt and then freeze again, and we call them hailstones.

Explain the formation of dew and frost.

By placing a shallow dish of water in the window show how the heat of the sun changes water into vapor. After a time the dish will become dry.

Watch the face of nature through each season, the mild weather in spring and frequent rains. What work must be done in preparing the ground and planting seed at this season? The teacher will show the pupils how to prepare the earth in each little plat of ground, plant the seeds, keep the vegetables and flowers free from weeds, and market the products. Arrange for each child to have some capital laid by from his work, which he will be encouraged to keep and add to next year. Each year the gardens must be larger, more extensive crops raised, and more money added to the bank account, teaching the pupils that later in life this will be their work, only with larger fields to cultivate, more extensive crops to harvest, resulting in a bank account that is proportionately larger.

Explain the growth and maturity of all kinds of crops in summer; the fall with its cooler nights and days and occasional frost; the gathering of crops and drying of vegetation; then winter, nature’s resting season. Tell the pupils how the cattle suffer during this season without shelter and food, and how it is as necessary to feed cattle regularly as it is for man. Eating one day and fasting the next lays the foundation for impaired health and inability to work; and teach how important it is to raise and put away enough feed in summer to supply the cattle during the winter.

The work of the farmer. How the elements help him, and how the earth is his best friend, and therefore the great need for taking good care of it.

Show how the wind helps to clean the earth and make it more healthful, and also how it causes rains and moves clouds from place to
place. Have the natural divisions of land illustrated on the sand table. Observe the action of the water upon the land in the school yard and vicinity.

Study the earth as the home of plants and animals; how each is peculiarly fitted to its environment; how all animals make their homes near where their food is to be had.

Show the work of frost and ice; how when water changes to ice it takes up more room than it did before, how it will break a glass or dish or a cask. When it freezes in the crevices of the rocks, it splits them.

If there is a mill near, call the children's attention to it and explain the necessity for damming the stream to turn the wheel to grind the grain into flour in order that it may be fit for use as food.

Study the plants, animals, and trees of the locality and their respective uses to man.

Explain how sunshine and fresh air purify our houses and keep away disease, and how necessary it is to have our windows open and let a great deal of the sunshine into our houses every day. Observe the yellow, unhealthy appearance of plants that have been in the house where they could not get the sunlight.

Show how the animals find dens for their homes, snakes have holes, and birds have nests, and from this lead up to a discussion of the homes of men. Talk about the material used in the construction of houses; of the great value and many uses of trees, their uses for fuel, for medicine, for making baskets, for furniture and implements of many kinds, and especially for building. The earth is truly our mother. We live on its bosom and it supplies most of our food. Explain how plants draw some of their substance from the air and some from the ground; that both are absolutely necessary, and one is useless to produce life without the other.

The teacher will show that it is difficult to till the soil where the land is hilly and stony. Where the hills are very steep or where there are very many rocks in the soil or where there is not much rain, sheep and cattle should be raised and sold to the butcher, or used for dairy purposes, making butter and cheese.

Dwell upon the importance of herding and dairying.

The teacher will give the geography of the locality. For example, in regions where large trees grow the importance of lumbering will be emphasized. Explain the processes used by the lumbermen of the vicinity in cutting down the trees and transporting them to the mill to be sawed into boards and timbers. Teach the relative value of the different varieties of trees for certain purposes; how logs are cut in winter and hauled to streams and in the spring floated down to sawmills in large rafts or loosely to a boom. Explain how rafts are made; the binding of the logs together, and what is used for this
purpose; how rafts are guided and piloted down the stream. In like manner, show the uses of booms and how they are made.

In localities where mining is the industry the lessons on the work of miners will form an important feature of the geography taught. Here also may be emphasized the lesson that the earth is the home of man and his best friend, and has stored for his use in its caves and under many layers of earth vast supplies of minerals—tin, salt, gold, coal, iron, and innumerable other valuable things. Show the difficulties and dangers of the life of a miner, and on the other hand the value and importance of his work.

In schools located near great bodies of water fishing is an important industry, many tribes being dependent for sustenance on the fish caught. Teach the most effective and advisable way of fishing in the locality—the tackle to be used, the different kinds of bait, the cleaning and drying of fish, and preparing it for market. The most improved methods of doing these things should be shown, that the Indians may successfully compete with the white fishermen. The different kinds of fish and those most desirable and marketable.

At schools where there are manufactories near, the children must be shown that the raw material as it comes from the earth is usually unfit for use in that state. For example, wheat must be ground into flour, iron ore smelted and made pure, timber sawed into lumber, stone cut into the proper shapes, and cotton and wool woven into cloth. Thus men change raw material into finished articles, and the work is called manufacturing.

Whenever wheat is to be thrashed take the children to see the work. If a flour mill is near, they should go to see how the flour is made, comparing the process with that used at their homes.

Methods of transportation must be taken up, comparing those in use to-day with those the children can recollect as having been utilized in the past. Find out what method of transportation is in use for transporting goods from the reservation to the nearest market.

Have the pupils learn everything possible about the school grounds and each field of the school farm; the kind of fences; what grows along the fences; what in other parts of the field.

The character of the soil and what grows naturally; what by cultivation; the natural drainage of the land; the minerals, if any.

Study the railroads, if any, of the reservation and vicinity; their advantages to the reservation.

What products are sent from the reservation to other places and what is received in return.

FOURTH YEAR.

Continue the study of the people who live on the reserve. Who were the pioneers? How long have the Indians (who live there now) been there? What people were there before the present occupants?
The prominent people in the neighborhood (white and Indian); their work and influence; the lessons we should learn from their lives.

It is well for each school to have a collection of soils and minerals, as well as the grains raised; also properly colored drawings of all vegetables and fruits raised in the locality. Models of the fruits and vegetables raised should also be made for this collection. Drawings of the principal industries must be made. For example, if pottery or basketry be the work of the tribe, have the pupils make drawings of the different shapes they have seen at home. Stimulate effort in this direction by having pupils try to see who can bring the largest number of shapes. These drawings must be colored in the schoolroom to correspond with the articles seen at home and then carefully preserved, as they will be great helps in the work of teaching the native arts and perpetuating the work of the older members of the tribe.

FIFTH YEAR.

Review the work of third and fourth years.

The pupils must be impressed with the importance of studying the earth with reference to its special fitness for helping them to make a living. Study those crops that will bring the best results in the environment. Consider the surroundings carefully, and show that the industry that pays best is the one for each to follow. When the farm is near a town, gardening often brings large profits. Pupils can not be too strongly impressed with the necessity for following the farming of their section of the country, but remembering "that competition is the life of all trade" and that only the best crops will bring the highest market prices; that while work is being done, it is just as easy to put thought into it and the determination to make it as good as the best; that this is not a selfish motive, for while the best prices will go into the pocket of the one who receives them, he is also a public benefactor, since it increases the value of the farm, raises the owner in the estimation of the community, and will result in making him a useful citizen, which should be every man's aim in life. Show that a county progresses most that has the best agricultural features; that it pays to go carefully into the raising of fruit and vegetables; that in such counties good roads (which mean less wear and tear upon vehicles and beast), good schools, and many other advantages follow. Remember the Indian child at home has fewer opportunities than the average white boy upon the farm, and he must be given those opportunities at school to broaden his range of thought. He inherits a love of outdoor life, but lacks the faculty for constant application to daily tasks. He must be taught at school that the law laid down by Saint Paul, "That if any man will not work let him not eat," applies to-day, and the child must be gradually led to see the necessity for leading
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this kind of a life. Inspiration comes to a man from contact with real work. By reserving a few acres of land at each school and conducting a model farm, in which all must have a hand during the school life, the pupil will prove for himself that by conducting a rotation of crops and keeping strict account of every expenditure and all receipts a man may furnish food for himself and family, while cultivating a large number of acres will bring in a large surplus.

Every boy and girl should have sufficient knowledge of tools, agriculture, and of business to apply practically to the betterment of the home, the crops raised, and prices received. They should see the necessity for getting rid of poor grades of animals and getting good ones, and that the money received from crops and put back into the farm will pay interest on the investment. That it is better to have fewer dogs and more pigs. It is a good way to help anchor a family to encourage them to raise chickens and pigs, since these can not be induced to lead a nomadic life. The teacher must give many problems involving marketing products of the farm, the garden, and dairy, and getting in return the necessities of life for the family, new implements needed in the work, general repairs on the farm and buildings, replenishing stock, and retaining a surplus to add to the bank account. Impress the importance of always putting away a little, no matter how small the income. These accounts kept by imaginary farmers in the classroom will materially aid the pupil in handling money wisely.

Show the pupils that to steal the necessities of life is to lead a criminal career; to live upon the result of others' toil is to become a parasite; while the one high, honorable way by which these things are to be obtained is by honest toil, and remember that the education that does not develop one's power of usefulness is of little value.
HARNESS MAKING.

In fitting the Indian child for life, his training must be general, "that its possible economic application may have the widest range." Many pupils must return to their allotments given them by the Government, where they must make their homes, and it is essential that they go equipped with "manual dexterity, which means also mental power," and this, coupled with a knowledge of materials and a familiarity with tools the hand uses, will enable the boy to use practical judgment and readily master material forces and problems.

"Manual education should be broad and liberal. The primary object is that the pupil may acquire that mental keenness which is the natural outgrowth of a mastery of materials and typical tools and of logical processes fully comprehended and intellectually executed." The object is not to keep the pupil at work at what he can do best, but rather that he shall discontinue any task that he has learned to do well and be put at something new. Thus a systematic and progressive course of work is given him by which he may receive such all-around training that when he returns home he may be able to do whatsoever his hands find to do. As one of our best manual-training schools expresses it, "the boy is the most important article to be put on the market, and everything in the school is for his benefit."

Teach the essential principles that underlie a number of trades and ability to do many kinds of work rather than giving the boy a trade. See that he has gained intelligent ideas of tools and their uses, the laws of mechanism, the properties of wood, iron, leather, and other materials. Teach system and precision.

The aim must be to give a more symmetrical education, employing the brain and hand by using books and tools in order that increased interest in all work and more useful citizens may result.

The records of many schools in all parts of the country show the wholesome moral influence of manual training, a change for the better in the boy's attitude toward school work, and a rapid development in earnestness of purpose. That the moral influence is strong and continuous is shown by the lives and character of thousands who have taken advantage of its training.

The teacher is the great awakening power, and when he has succeeded in getting the pupil thoroughly interested he can appeal to his mentality, for when a child is interested he becomes curious and begins to observe, and when he observes he begins to acquire knowledge. He thinks; he learns.
Manual training begins the first year in school, when the child lives the life of the home with the dolls, when all familiar objects are cut out of paper and modeled in clay. The horse that has been so carefully molded of clay needs harness that he may be hitched to the little wagon, also made by the children. Thus in the kindergarten the child appreciates the need for harness, and later, when he is put in the shop, will have in view the harness that he will need at home, and will learn the necessity of keeping it clean and well oiled, the broken parts mended, and the weakened and worn places strengthened. This work will be learned in the harness shop in keeping the school harness in repair.

The boy must first be taught to make a wax end; then give him scraps of leather to sew upon until he learns to make a good stitch. He will then be advanced to strap work, which necessitates much practice on stitches. Six stitches to the inch is a good rule for beginners. In this practice on straps they learn to make the simpler parts of the harness, such as hame and breeching straps, putting on buckle and loop, fitting and making brow bands, throat latches, etc. It is highly important that the pupils be taught to consider the comfort of the horse and how to fit harness, showing the proper way of adjusting the harness to the horse, making it neither too tight nor too loose, how to tell from measurement the proper size of the collar suited to the particular animal, and impress upon them the cruelty of compelling horses to do heavy work in collars that are too small or too large, and that this kind of treatment often disables an animal. The use of the checkrein must also be discouraged for draft animals.
Continue to give plain work, such as traces, folded breeching, belly-bands, and hip straps and halters. The necessity and value of good, careful stitching can not be too strongly impressed.

The making of the different kinds of pads used on harness is a very important branch and should be taught carefully.

Talks should be given frequently on leathers of different kinds, where obtained and how tanned, and those best suited for the different parts of the harness; also upon the proper care of harness and the tools and materials used in making harness.

SECOND YEAR.

Continue the work on straps and give thorough instruction in making bridles. Give also the round work, such as round lines, bridle reins, winker stays, hip straps, and cruppers. Be sure that the pupils know the names of all tools and how to use them. Talks will be frequent throughout the year on leathers and the proper care of harness. Practice will be given in cutting leather in an economical manner. The general average prices of the various kinds of leather will be learned by the pupils.

THIRD YEAR.

The work this year involves much practice in cutting and fitting all parts of harness and in putting them together to complete a full set of harness, and the talks must embrace a thorough study of leather and where to obtain the best grades, the kinds and styles of harness. Practice will be given in estimating cost of leather and all supplies pertaining to the harness trade. Drawings showing the different parts of harness, as well as complete sets of harness for wagons and carriages, will also be made by the pupils from memory as well as from the articles themselves.

The harness trade is one of the most useful and highly necessary for the boys to learn. Every man who is likely to have anything to do with horses should at least know how to take a set of harness apart, clean and oil it, and put it together again, supply such parts as may be missing, and repair the parts that are broken or weak. A good farmer keeps all of his harness hung up properly in a particular place. Hence the instruction given at the schools in harness making should fit the boy, upon his return from school, to keep his harness in good repair, supply missing parts, and not to have to resort to ropes, strings, etc., to tie the parts together. Good, strong harness frequently enables the driver to check his horses when frightened, often preventing a runaway, accident to life and property, as well as injury to the disposition of the animals.

At many of the large nonreservation schools practical instruction in harness making is given and excellent work done in leather, so that boys desiring further instruction in this trade, in order that they may become skilled workmen, can obtain this knowledge by attending one of these schools.
HISTORY.

Begin teaching history by telling the children the story of their tribe and then of their race. Relate to them legends and stories such as will excite and fix their interest. Have the pupil tell you what he can of the history of his forefathers and of his tribe as it has been handed down from the fathers and mothers in tales told around the camp fires. The parents have lived through pages of history. Oral and written reproduction of all such historical stories should form an important part of the work.

Have collections made of pictures, relics, etc.
Stories of the mound builders; where they lived and what they did.
Endeavor to arouse in the pupils an interest in the upward struggles of their people in the past and a determination to do their part toward the progress of their race in the future. Always seek to create a spirit of love and brotherhood in the minds of the children toward the white people, and in telling them the history of the Indians dwell on those things which have showed nobility of character on the part of either race in their dealings with the other. Relate the innumerable instances of heroic sacrifices and acts of friendship on the part of white settlers and missionaries, and the equally bright examples of faithfulness and devotion by the Indian inhabitants. Whenever acts of injustice must be related, show to the pupils that the guilt of the persons committing them does not attach to the whole race, for in every people, no matter how virtuous, there are always a large number of the unconscientious and the cruel.

Study the arts and industries of the Indians in the past. Examine their methods of agriculture, and compare them with those of to-day, showing them how many more advantages they will have than had their ancestors, and how they ought to make good use of them. Considerable time should be spent at this point in the study of things relating to agriculture, the various products now raised and those raised in the past, those which are best suited to the particular locality, and, in general, everything that will be useful to the student as a future citizen. This will assist the student much in his regular work in gardening, farming, etc., and tend to deepen his interest in those branches. The importance of this subject can not be overemphasized.

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Compare the Indian life of the past with its present, and what it
should and will be in the future; the houses the old Indians built;
their food, occupations, and manner of living. Tell them that their
history will be what they make it, and they should feel the respon-
sibility for making it bright. They must clear and improve, fence, and
carefully cultivate the land which shall be their farms; keep cows,
horses, poultry, and other domestic animals; build barns and houses,
and attain to the proud position of self-sustaining independence. In
this way, and only in this way, can they make the next page of Indian
history a glorious one. To them will fall the credit of success, and on
them will rest the stigma of failure.

Tell them that agriculture is the natural industry of mankind, and
that it is peculiarly the industry of the Indians. They should think
and plan long before leaving school how they will have their farms
appear. They should be content with nothing but the best results
possible.

Examine the various products that can be raised in the locality and
which are most profitable; what are the available markets; what prod-
ucts of the Indians who were their ancestors are profitable to grow
to-day.

Give attention to the other industries of the old Indians, and com-
pare them with those the Indian of the rising generation will have at
his command. Endeavor to imbue the youthful minds with an appre-
ciation of their advantages and with the purpose of making use of
them to give them comfortable homes and a state of contented inde-
pendence.

Distinguish between those arts of the old Indians that are useful
and those that are not, and encourage them to preserve and carry on
the latter. For example, urge the girls to learn basket making, bead
working, pottery, etc., from their elders, showing them how they may
make nice sums of money in this way.

Study something of the history of basketry among the Indians and
show the children how proud they should be of the splendid work that
has been done in the past. Study also the different designs and weaves,
and learn in which kinds the various tribes excelled. Get as many
specimens of baskets as possible. Take a basket and find out where
the grass grew that composes it, and if possible get a sample of this
grass. Then see if this special grass may be cultivated and grown in
the locality of the children’s homes, and if so, urge them to plant it
for use in practice in making these baskets. Also ascertain, if possi-
ble, how the dyes used on the baskets are made, from what plants
obtained, etc., and then whether these plants will grow in the vicinity.
Learn something of the history of the basket in hand and what the
design symbolizes. Urge the children to endeavor to make baskets
of their own and learn the art from the old Indians, and show them
the value of weaving symbols in their designs and the importance of using the beautiful and lasting native dyes. Collect the baskets which the children make and place them in the schoolroom. In this way a very interesting and decorative display may be made, which may be made still more attractive and useful by having the children contribute such baskets as they can obtain, which have been made by the old Indians. Keeping the baskets continually before the eyes of the children will have a tendency to induce them to endeavor to make baskets of their own and to excel, if possible, the skill shown in those before them. It will also educate their eyes to what is really artistic and tasteful. Foster a rivalry among the children as to who can make the best baskets, the best ones of each child being placed on exhibition. This will be a great stimulus to hard, earnest effort and a desire to become more skillful in the art by learning from the old Indians at home.

The same plan may be followed with beadwork and pottery, and soon the teacher will find her schoolroom a place of real beauty and itself an education to the children. It will create a love in the hearts of the children for the native arts that are useful and beautiful and so do much toward promoting the industry among them both now and after they leave school.

Show the pupils how the practice of these arts may be made very profitable. Explain to them that the more "Indian" the baskets are the more valuable they are and the better price they will bring. People do not care for baskets decorated with aniline dyes, and the native dyes should always be used. Explain to them which kinds of baskets, pottery, and beadwork are most sought after and sell most readily. If possible, give the prices which certain baskets command, obtaining a price list from some trader or elsewhere. It might be well to endeavor to sell some of the baskets and other native work brought in by the children and thus impress by practical demonstration what you are teaching them.

At some schools basketry will be taught separately, and even here this work in the history class will be of very great assistance and add to the child's interest in it and associate it with his pride of race by linking it with his history. In those schools where the native arts are not yet taught as a distinct branch, these injunctions are of special importance, as they form the chief means of promoting the valuable native industries so important to be preserved.

Take up the subject of cattle raising and dairying. Find out how cattle figured in the history of the old Indians, and how it will figure in the lives of the Indians of the future. Study cattle raising; the different breeds and those best suited to the locality; their feed, different grasses and grain raised for feed; their care, housing, pasturage;
how profitable, either for beef or dairy purposes; the available markets, etc.

Take up in a like manner the other industries, such as the raising of hogs and the raising of poultry.

Irrigation will also be a valuable subject for study in many localities where it is necessary for farming.

Then give instruction in the history of the United States. It is not desired that American history be studied with much detail, but rather a general view of it given the pupils. They should know enough about it to be good, patriotic citizens, but valuable time should not be used in learning minor details. They should learn a few important dates, such as that of the discovery of America, settlement of Virginia, Declaration of Independence, etc.

Describe historical events, as the discovery of America and the landing of the Pilgrims.

See that the event turns on the person, showing examples of patriotism, valor, self-sacrifice, heroism.

Theories as to the shape of the earth. Spirit of adventure.

The important events in our history, such as the great wars, should be given attention, but not in detail. Show the causes of the various wars, what were their principal results, and who were the great actors in them. The names of our greatest men, such as Washington, Franklin, and Lincoln, should also be learned and something about the character and work of each.

Employ public anniversaries and the birthdays of great men like Lincoln, Washington, and Longfellow to give historical information—points of general interest, not minute details. In the early school days it will be enough if they know there were such men.

Adapt also stories appropriate to Thanksgiving, Christmas, New Year’s Day, Arbor Day, etc.

Enlarge upon national holidays; history of our flag; patriotism; loyalty to a cause; one’s institution; one’s country.¹

Teach the general character of the Government of the United States and how it is conducted. Explain its relations with the Indians. Show its liberality in providing a free education and training for the Indian children, and that after they leave school it expects them to make use of their education and support themselves. Teach them that they have not a natural right to a living from the Government, and that soon they will be thrown upon their own resources, and should now prepare themselves to be able to make a living.

Give lessons in State and local government; how public officers are chosen; the principle of self-government. Use the time of elections for such lessons, collecting ballots, posters, etc. Explain the three

¹Carlisle Course of Study.
branches of Government—executive, legislative, and judicial. Explain in a simple way the workings of a court, its purpose being to preserve peace and order by redressing wrongs and punishing crimes.

Teach the pupils how to organize and manage a public meeting. Under this head, also, teach the following:

Recognition of value of order; necessity of rules, law, offices; respect for and obedience to officers.

Teach town government; the duties of the commonly known town and county officers—policeman, constable, judge, court and its management; court-house and other public buildings.

Vote by ballot, conduct elections at "election time," and town meetings.

"As people conduct themselves, so is the Government. The government of a city, State, or nation is in the end what the majority wish. Therefore, history can not be separated from good conduct, which includes morals and manners."

"In the lowest grades these must be made concrete. Stories read or told to the children inculcating a spirit of kindness, generosity, usefulness, punctuality, obedience (without having the teacher always attempt to draw a moral or point a tale) are productive of more good than set talks on morals and manners."

"Training in politeness and courteous forms of speech and action; duties to parents, teachers, elders, obligations to society; the difference between true courage and that shown by the bully; the effects of cowardice in not standing for the right; these are of more importance than simple historic facts; and we must always remember that youth is the seedtime."

Teach self-control, self-reliance, order, industry, etc., without sermonizing, without talking about it overmuch.

The school a community where each yields something to gain much; value of order; necessity of rule—law.

Obedience to teachers and those placed over us to help us.

Note.—Follow hints and suggestions of pamphlets and helps on subject. All school work subordinate to character building and aiming toward that. "All teaching should be ethical." The individual, the family, the community, the State, the nation, are a progressive series.

Morals and manners; etiquette and customs of most refined people.

Use story, precept, example. Make these subjects vital to each pupil.

Base your work on recognized needs of pupils from your observation.

Encourage self-possession, repression, and absence of self-consciousness.

The Indian policies and changes; internal improvement; growth of industries and change of systems; revenue systems; education and the change of the life of the people.1

The central thought is preparation for citizenship.

Correlate history and language, requiring all stories to be retold in good English. Lead him out by judicious questioning, as, Who can tell about the little Indian girl who saved a man's life?

The teacher should make an outline on the board of the most prominent points in the lesson, writing as she presents each, thus impressing the lesson more firmly upon the minds of the pupils. It is well to let each one have a blank book, kept only for this subject, and take down the outline after the lesson. Thus each child will be writing his own history, which will begin with that of his tribe.

1 Carlisle Course of Study.
HOUSEKEEPING.

The daily necessity for doing a given amount of work in the different departments of the school affords pupils ample opportunity for "learning by doing."

The house mother who is responsible for the comfort of the home requires help in preparing meals, making the clothing, and keeping the linen clean. While on the farm the necessity of raising food for the family directs every thought and effort of the boy in the line of practical farming, and the effort put forth in every department of work is to develop resourceful men and women, not machines.

It is the privilege of the class-room teacher to unfold the meaning and dignity of this work.

The art of housekeeping, as learned in the home under the mother's eye, is what we want to teach our Indian girls, assuring them that because our grandmothers did things in a certain way is no reason why we should do the same.

The good housekeeper is the arbiter of the health of the occupants of the home, and special stress must be laid upon the hygienic and sanitary laws. Years ago conditions were different; people were not grouped together as now. The ancestors of our pupils often lived in one place, then folding their tents moved to another site, and the wind and rain, snow and frost, did the work of disinfecting that the housekeeper now has to see to, since homes now are fixed.

Let all the sunshine possible into the homes and lives of the family. "A beneficent Providence makes sunshine develop useful plants and animals, causing them to grow, while it kills germs of disease."

Attention must be given to the food eaten, the water used, and the air surrounding the home; to the furniture of the house, and to the manners and morals of the members of the family. Unselfishness, consideration for others, and a spirit of helpfulness, together with a sense of right and wrong, constitute good habits and manners of the individual members of the household.

The following rules, as laid down by Mrs. Johnson, of Haskell Institute, are excellent:

"'Cleanliness is next to godliness.'
"'Always on time; never late.
"'Hurry your work; don't let your work hurry you.'
"Don't be afraid of work; do not think it degrading.
"Waste not; want not."
"Be helpful; what we do for others helps ourselves.
"See what needs to be done; not wait to be told.
"Do something for somebody and do it quick."
"Be your best at home.
"Learn the dignity of serving, rather than of being served.
"A happy, healthful home is the foundation upon which the welfare of the family and the prosperity of the nation rest," and a systematic knowledge of things relating to the home is a lesson all girls should learn.

In order to become good citizens, men need clear minds and strong, healthy bodies, which require proper food.

The ideal training for girls is that which will instill a love for home and make good, neat housekeepers.

Impress the value of using soap and water generously on the person and in the home. The housekeeper whose dress is neatly made and well laundered is an attractive sight. Clean floors and neat surroundings make home pleasant, and the family will appreciate a table neatly set, and where good bread and well-cooked meals are to be enjoyed. The teacher and the house mother must so order the movements of her family that each one shall become skilled in all branches of household work, and it can not be too strongly impressed that each girl must be given at least a year's experience in planning and preparing meals for a small family. Boys and girls must be taught to make and keep up fires, and the necessity of providing sufficient fuel in pleasant weather to keep the family comfortable through stormy seasons.

Every girl must be taught to make yeast, to make and bake all kinds of bread, to cook cereals, meats, vegetables (boiling and steaming), soups; to make plain pastry, cookies, cake; to dress and cook poultry, to prepare eggs in a number of palatable ways; to prepare beverages; to do simple invalid cooking, to warm over and to utilize the unconsumed food. Attention must be given to the hygienic conditions of the kitchen and surroundings, exercising great care that refuse be placed where it can not sink into the drinking water.

Drinking water should never stand uncovered. The value of pure water can not be too strongly impressed, for, as a well-known writer has said, "this fluid which infuses new life into mankind, is likewise the chief vehicle through which disease and death enter the body."

The question of bacteria should be emphasized, their enemy being cleanliness. Wash all cooking utensils, garbage cans, milk pails, pots and pans of all kinds, with boiling water, which destroys many germs. Filth is the surest breeding place of disease. All food needs to be protected from germs and dust, and should never be left uncovered. The health and happiness of the family depends largely upon the
cooking. Scientific cooking lessons should be given our girls, that they may see the necessity for varying the menu, that the whole system be nourished. For example, a dinner of potatoes only, gives starch to the system, and should not be prepared successive days.

The nitrogenous foods (beans) and foods of animal origin are the tissue-making foods. The carbonaceous starches, sugar, fats, etc., the inorganic foods—such as water and salt—each do their work in helping to build up some part of the human being. Good health and robust constitutions demand a necessary combination of all. Teach also the process of digestion, the principles underlying the cooking of foods, economy in food.

Since “the destiny of a nation depends upon its food,” it is important that we show these Indian children that their first duty is to help build up a strong physical organism. Nothing weakens the brain as lack of nutrition. Someone has said that the brain can no more act with vigor without suitable nourishment than can a clock keep time without being wound. It has been shown that the lack of brain and nerve nourishment is one cause of the craving for stimulants.

Pupils must be taught to cut, fit, and make all kinds of wearing apparel and all articles needed for the household, and to be resourceful; using every scrap in some way, throwing away nothing. Economy in housekeeping is an all important lesson. Teach girls to care for the sick, to dress wounds, put on bandages and simple appliances for the relief of pain, thus fitting them for the emergencies that come to every home.

The importance of teaching the laundrywork in a systematic way can not be overestimated. Pupils must be taught to make good soap. The importance of mending clothes before washing, and to wash, starch, and iron all kinds of wearing apparel and household linen must be impressed. Soiled clothes should not be allowed to stand more than a week without washing. Clothes should always be kept dry while waiting to be laundered, and hangings or dusty things should have dust shaken out before putting them into the water.

Encourage girls to excel in every branch of work, to be able to do such neat laundry work, good darning, and substantial mending that there will be rivalry among the pupils to work for employees and others and thus to earn money. Whenever any work of any kind is to be done for individuals for remuneration, such as cleaning rooms and putting them in order, it shall be given as a reward to pupils who excel in the work or to those who try to do it best.

Teach sweeping, dusting, care of lamps, washing windows, care of woodwork, care of kitchen, of floors, of cellar, and the disposal of household refuse. The best way to clean floors is to scrub with a brush and soapsuds once a week, and have floors wiped up daily with a slightly damp cloth to remove dust. Every girl should have some
experience in each department several times during each year, that she may become skilled in all branches of household work. Study the bent of each girl, giving each the help in special directions that she needs most. This will result in sending many to larger schools, where they may be better instructed in the vocation they select for life.

In the daily work of the school, encourage the girls to suggest the needed improvements. Endeavor to have them see where a clean curtain is needed, where a rent mended would improve the appearance, where a shelf added or a piece of furniture changed would add to the comfort and appearance of the home. Let the girls see the need for changes made and the lesson is more thoroughly learned.

Have the girls take turns in the management and care of the house, the sweeping, scrubbing, and dusting; the care of beds, filling up all cracks and holes with putty, that vermin may have no place to breed in; the care of bedding, seeing that it is kept clean and properly aired, and that beds are neatly made. The most approved manner of making beds is the method employed in the Army, the covers and upper sheet being rolled in a roll from the head to the foot, thus leaving the bed open. Pillows are inadvisable for children, and beds are better made without them.

The importance of keeping sleeping rooms well aired during the day must be shown, and no food should ever be kept in a room where people sleep.

"The routine of the school should tend to develop self-directed toil. The pupil should be taught the marvelous secret of diligence. The consciousness of power springing from the experience of 'bringing things to pass' by their own efforts is often the beginning of a new career of earnest endeavor and worthy attainment. When the Indian children shall have acquired a taste for study and a love for work the day of their redemption will be at hand. During the school years of the child's life, from 6 to 16, much can be accomplished in giving girls a knowledge of, and practical experience in, all household duties."

The dignity of labor should be impressed upon the mind of the Indian student and the virtue of economy should be emphasized. Indian children have received much at the hands of the Government. They have had only to ask to have anything lost or misplaced replaced without having to put up the money to pay for the same, and a spirit of prodigality is apt to result. Things that have to be worked for are appreciated twofold. As so well stated by a prominent Indian worker, "When the Indian child has to work for his education, he will appreciate it at its true value."

Children should be taught to put to the very best use what is so generously supplied by the Government. They must realize that these lessons in economy are given to enable them to make the best use of their own money when they leave school and have to depend upon
their own exertions for a living. Then they will want to know how to get the most for a dollar, and the one who knows how to spend a dollar well is the one who always has one to spend.

If there is time for nothing else, housekeeping must be taught. Only the larger schools are provided with a teacher of domestic science, but the matron, cook, laundress, class-room teachers, and other employees can give special instruction in cooking, each giving one lesson per week. The materials supplied by the school for the pupils must be used, and in a variety of ways, and the pupils must be taught cooking as done for a small family. This work may be placed under the immediate direction of the cook, and every day one girl should prepare an entire meal for one table in the dining room. It is expected that every girl shall have sufficient practice in this work to enable her to do it alone. Each girl should cook for one table seven days in succession, that she may learn how to vary the food and the preparation of the same and make economical use of her materials.

Teach pupils the bad results of running bills at shops. Cash payments should always be made, and the income of the family so divided that the housekeeper will set aside a certain portion for household expenses and live within that amount. Every housekeeper must buy clothing, food, and fuel, and there are incidental expenses often to be met. It is a good rule to put in bank each month a part of the income and to divide the balance among the expenditures, making each cost less, if possible, than has been set aside to use, practicing economy in all departments by wasting nothing.

Reverses and illness come to the best-regulated families, and it is wisdom to have simple, well-cooked food, simplicity in dress and living, and a bank account to resort to in time of need.

Household Economy, and other books of a similar character, are good for reference.
THE LAUNDRY.

The training in doing laundry work begins as soon as the child enters school. This highly necessary lesson can not be commenced too early in life, and the first years in school it will be presented in such an attractive manner that the child will enjoy assisting in the work, and be given one of the most important lessons that must be learned.

It is not expected that children will appreciate the importance of well-bleached linen and faultlessly smooth ironing, but it is intended that from the start they shall be trained in doing laundry work systematically; also the necessity for hygienic living. The care of the dolls’ homes is the center around which all work in the kindergarten is planned, and this includes washing and ironing the clothing and linen of the household each week. This work must be taught systematically. First, have a proper place and a receptacle for all soiled linen in the dolls’ house, never allowing any to be put away damp, lest it mildew. On wash day the clothes must be properly sorted, washed, and dried, when possible, out of doors. On ironing day they are sprinkled and ironed, excepting starched clothes, which should be mended before starching, while next day everything is carefully mended. With this training in the class room, the child will have some idea of the work in the laundry.

Each pupil should have a laundry bag, and be responsible for all personal apparel. This fosters responsibility and will tend to make children take better care of their clothing. The matron must see that all garments are marked with the name of the owner, thus avoiding confusion and enabling the clothes to be located. Children can not be taught too early in life to be responsible for their own wearing apparel. Clothing that is common property is rarely appreciated as personal belongings are. This is a lesson every child needs to learn, but the Indian child more particularly.

When children are quite small, they can assist in the laundry, staying an hour at first and gradually increasing the time for work as the child develops physically. There are many light pieces that can be ironed with small irons and easily handled, and in assisting with the light work the child absorbs many lessons which will broaden his knowledge of general laundry work.

It is always wise to have at least one girl in the laundry detail at all times who is thoroughly familiar with the work, and in whose care
the smaller pupils may be placed, that the larger pupil may assist them in the difficult parts, and show them what is to be done, and how to do it at all times. In this way the laundress will always have a trained class of helpers who will be able to render valuable assistance when they have gained skill in doing the work in the laundry, and are ready to take their places as helpers to instruct others just starting. In doing the laundry work for the school the children will have an opportunity to learn how to wash and iron all kinds of clothing and all washable articles, and each girl should spend at least three months out of every year in the laundry.

In laundries where the work is heavy and must be done by machinery the laundress must have tubs and teach each girl how to wash, using boards. Each week every girl on the detail should do some washing in this manner. When pupils return to their homes, they will have few facilities for doing laundry work, and it is expected that every pupil shall be taught to wash clothes, using the tub and board, to wring them by hand, and to iron with irons. So much of the health and comfort of life depends upon the cleansing of clothing and linen used in the family that the subject should be studied carefully. Clothes should be rubbed on a board to remove the dirt.

Laundry soap should be cut in fine shavings and put with boiling water on the back of the stove to dissolve.

In sorting clothes the finest should be put together and the coarsest in another pile.

Remember that clothes will never have a good color unless they are thoroughly rinsed.

In washing blankets select a clear, windy day, that they may dry thoroughly. Shake blankets well before washing, and if they have any soiled spots on them rub the spot with a brush, using soap.

The laundry must be supplied with oilcloth aprons, that pupils may not get their clothing wet when washing at the tubs. Overshoes should be worn by the pupils when floors are wet or when they have to walk on damp ground. Pupils must not be allowed to go out to hang out or bring in clothes when overheated, and they should always have a jacket or cape to protect the lungs and some covering for the head in bad weather. Good health is one of man's greatest blessings and it should be guarded intelligently.

The laundry should be supplied with a detail of not less than four girls and one boy. The laundress and her assistants will be expected to do all the laundry work of the school, including wearing apparel for boys and girls, table and bed linen, curtains, towels, and everything that is needed for the comfort and well being of the pupils. All body linen should be changed once a week at least, and individual towels and handkerchiefs must be supplied the pupils.
Tables, stands, and bureaus should be supplied with neat, clean covers, which pupils should take pride in keeping well laundered. Ornamental center pieces should be made, kept well laundered, and used on the tables in the dining room. The windows must be ornamented with curtains which will show the skill of the pupils of the school with the needle as well as in the laundry.

It is well to starch all wash dresses and aprons, since they will then keep clean much longer.

Comforts and blankets should be washed at least once a year.

Never send any articles out of the laundry until they are thoroughly dry.

The school laundry is maintained not only to keep the clothing used at the school in proper condition and thus train the pupils in habits of cleanliness and civilized ways of living and for hygienic reasons, but also to teach the pupils how to do family washing themselves. The training must be so systematic and thorough that the pupils will see and feel the reasons for washing all articles clean and making them look as attractive as possible. They must be taught to do the work in a systematic way: first, in having a place (not in a sleeping room) to keep all soiled articles; next, in sorting clothes properly before washing, not mixing white and colored garments nor woolen and cotton; washing thoroughly, using plenty of soap, and rubbing well on washboards; rinsing properly and drying in the open air, and in ironing smoothly. All this must be done, and done rightly, in order to insure healthful physical conditions and establish those habits of cleanliness which are the first essentials of a well-regulated and civilized home.

The laundry should be equipped with:

1. Clothes baskets.
2. Clotheshorse.
3. Clothespins.
4. Clothes sticks.
5. Clothes wringer.

Duster for lines and horse.

Heavy paper.

Irons—
1. Heavy.
2. Light.
3. Polishing.

Iron rests and holders and ironing tables.

Ironing boards for—
1. Bosoms.
2. Skirts.
3. Sleeves.
Scrubbing brushes, spoon, and strainer for starch.
Tubs, small and large.
Washboards and water pails.
Alum.
Ammonia.
Bluing.
Borax.
Kerosene.
Salt.
Soap.
Starch.
Turpentine.
Vinegar.
Water.

The following method of proceeding is recommended, to be observed in the order given:

1. Soaking.
2. Washing.
3. Rinsing.
5. Rinsing.
7. Hanging and drying.
8. Sprinkling.
10. Folding.
11. Ironing.
12. Folding.

As before stated, it is necessary for health and cleanliness that clothes be washed once a week. They should first be sorted; then remove carefully all stains, rust, or grease spots before putting into hot water, as this and the soap are likely to "set" the stains. Never allow damp clothing to lie folded, as it is very likely to become mildewed.

Flannels must be washed alone and with great care. All waters used should be of the same temperature. Never wash in dirty water. Do not soak, boil, or rub on a board. They should be passed quickly from one water to another. Do not rub soap on the flannel, but put it into the water. Rub as little as possible, and do not hang too near the fire. Place dampened cheese cloth over flannels to iron, and use moderately hot iron. Dry thoroughly.

Colored clothes must not be soaked nor boiled. Very hot water will dull the color. Use vinegar or salt to set the color. Starch will show less on colored clothes if the garment is wrong side out when starched. Hang in the shade and dry quickly.

Stockings should be washed on one side, then turned and washed on the other. Rinse in clear water.

Use only soft, clear water for washing. Soften hard water by using soda or ammonia, or by boiling, thus depositing the minerals which make it hard.
Alum will clear the water, while borax whitens and gives gloss. Use one-half pound of borax to 10 gallons of water. Kerosene will loosen the dirt, while turpentine whitens clothes. Garments should be thoroughly shaken out before going into the blue water. Rinse thoroughly lest the alkali of the soap decompose the iron compound in the blue and result in an iron rust or yellowish tint on the clothes.

Clothes should be rubbed on a board to remove the dirt. Very coarse and very dirty clothes should be cleaned with a scrubbing brush. This is excellent treatment for hand towels and overalls. Clothes should be washed first on the right, then on the wrong side. Wash in two waters, then rinse, put into the boiler with clear, cold water, having soap in the water; boil briskly five to fifteen minutes to prevent scum from settling on them. Take from boiler with a clothes stick. Before putting into the boiler, soap well all bands, seams, and hems of body linen. After boiling, rinse in two waters, both cold. This will aid in the whitening process, removing all particles of soap.

Tie lumps of blue in a cloth and rub into the water until it is the required color. Test by blueing a small garment. Open all clothes well so that they will not be streaked in blueing.

Wring clothes and hang in the open air when possible.

Starching: Starch for the trimming on garments should not be as thick as for the body of the garments. The following is a reliable receipt:

1½ tablespoons starch.
½ cup cold water.
½ teaspoon lard.
1 quart boiling water.

Cook slowly half an hour. The borax stiffens and the fat smooths the starch. Add a little blue water. Use starch very hot.

Wring as dry as possible and rub in with the fingers. Hang with the wind and wrong side out. When dry, stretch clothes and fold carefully, so that they may have fewer creases and iron more easily. Sprinkle and roll clothes, pounding the rolls to distribute the moisture. Allowing the clothes to stand some time will dampen them more evenly.

If irons are rusty, rub while warm with yellow beeswax and then rub quickly with a cloth. Irons are improved by washing them with soap and water and rubbing with sand soap. Iron table linen on both sides until dry. Fold all edges of handkerchiefs, napkins, and sheets evenly. Pull hems of sheets and dampen before folding. Iron hems carefully. Iron all bed linen very smoothly. Fold cases in thirds with only two creases. If clothes are too dry, use a cloth for dampening.

In washing shirts, shirt waists, collars, and cuffs, exercise care lest the color fade. Use one tablespoon salt to one quart water or vinegar.
and water. Rinse in vinegar and water. Do not boil colored garments. For such garments starch made as follows is good:

3 tablespoons starch.
\(\frac{1}{2}\) cup cold water.
\(\frac{1}{2}\) teaspoon borax.
1 quart boiling water.
Cook one-half hour.

Darken starch for black waists, using one-half cup coffee solution, and reducing proportionately the amount of boiling water used in making the starch. For blue waists, add blue water to the starch in the same way as the coffee, but do not add blue for pink, green, or lavender garments. Hang by the neck band, and, if the colors are delicate, out of the sun. Shirt bosoms, cuffs, collars, and front plaits will be starched by using a starch made by using 5 tablespoons instead of 3, as given in the above recipe. Rub in the starch (which is like a jelly) with the fingers, and then wipe the starch from both sides and see that the goods are free from wrinkles. Iron bosoms on a bosom board. In this way the body of the shirt will not interfere. After bosom is ironed remove the board and iron the neck and wrist bands and then the sleeves. The body of the shirt will come last. If collars and cuffs are attached, iron by first partially drying each side with a heavy iron, then rubbing with a polishing iron until thoroughly dry.

Iron turn-down collars flat, rubbing gently along the folding line with damp cloth to soften fold and make the turn easily. When collars or cuffs have been ironed, pass iron over the wrong side, at the same time curving collar or cuff over the iron, starting at the extreme end of the collar or cuff. Repeat two or three times. Roll turn-down collars after folding.

To put a dull finish on collars, etc., after being ironed, they should be carefully rubbed with a slightly damp cloth.

Cuffs and collars may be starched with cold starch and rolled in damp cloth, but more care must be taken in ironing.

Wash embroideries up and down in the water without rubbing. Rinse thoroughly, as soap will make them yellow. Do not allow to stand in the water. Iron on wrong side until dry. Do not fold; roll on heavy roll of paper.

Laces should be carefully basted on strips of cheese cloth. They should then be soaked in warm, soapy water, shaken out, soaked again, rinsed, bleached by laying in the sun, rinsed in borax water (4 teaspoons borax to 1 pint water), clear starched, handling carefully, and then laid on flannel, covered with soft cloth and ironed. Curtains should be stretched, not ironed.

After ironing garments, special care must be taken that they be folded properly.

To remove stains caused by tea, coffee, or fruit, spread stained part over a bowl and pour boiling water on it from a height. Use cold
water and borax for chocolate, milk, cream, meat juice, machine oil, and blood stains.

The following is a list of stains and what should be used to remove them:

For paint stains use benzine and turpentine.
For mucus stains use ammonia.
Alcohol will remove some stains left by medicine.
For ink, use milk or oxalic acid.
For grass stains, alcohol or ammonia will usually remove the stain.

In conclusion, pupils shall be taught in the laundry to make fires economically, to sort and wash white and colored clothes, the different ways of washing, rinsing, wringing, blueing, and starching clothes; the making of soap and starch, and also their use; using lye, drying clothes out of doors and in the house, sprinkling and ironing clothes, care of laundry tubs, buckets, utensils, machinery, and irons. The object is to teach all pupils to be able to do family washing expeditiously and thoroughly.

1 Many of the ideas on this subject are taken from the Laundry Manual prepared by Miss Limmerick of Drexel Institute.
MUSIC.

Music is an uplifting element in life and its power is felt. Teachers must not forget that amid the drill of daily work we are nourishing the souls of the children. In most of our school work we deal with the mind, while singing is the means by which we can reach the heart of the child, and so develop the good within him. We train the eye and hand and brain, and we should not neglect to cultivate the affections. Teach children the best songs. Be sure they understand the meaning of the words. Too often in singing in the schools the children repeat meaningless words which convey no idea to their minds. Help the children to erect for themselves high ideals, and this will aid them to choose the good in life.

Music as a moral factor makes the pupil feel the charms of harmony and beauty, thus softening and enriching his nature. There is no other study which so freely unites the physical, mental, and spiritual. Froebel believed that music greatly assisted the development of all the powers of the child; that it awakened the moral life, elevated the spiritual tone, and gave relief to physical weariness; therefore in the kindergarten the child is given songs and mother plays which are full of music.

Pure tone must be sought. This will be aided by using a pleasant tone in speaking, therefore cultivate it in all recitations and conversations. Tones are the expressions of our moods, and we clearly distinguish between the cheerful tone and the depressed tone.

The position of the body and throat while singing should contribute to the full expansion of the lungs; not only must the mouth be open nearly as wide as nature will allow, but the throat also must be open. The muscles may be made flexible by practice in speaking the vowels a, a, e, o, oo, first slowly and with correct enunciation, then more rapidly, and by using the vowels in singing the scale.

In the lowest grades the children may be given a few simple rote songs illustrating the lesson to be impressed. Have them sing in a natural soft tone, never permitting nasal tones.

A few exercises in breathing should be given before singing, and see that all children assume a proper position while singing.

Special attention must be given to the pronunciation of the words when singing; see to it that the final syllables and consonants are sounded.
To have free use of the voice, practice consonants as follows:

Tip tongue: la, la, la, na, na, ta, ta, da, da, ed, da.
Trilled: r, r, r.
Back tongue: ng, k, g, j.
Lips: oo, a, a, o, u, on, a, o, a, o, e.

Patriotic songs must be taught and the children told something of the life of the author and the reasons for writing the songs given. This leads up to the celebration of national holidays, when patriotic songs should have a prominent place on the programme.

Music should be considered as recreation rather than labor. Humming strengthens the vocal cords, and is good exercise for young children. Hum in octaves down the scale. This is a pleasant recreation to engage in occasionally while sewing.

Every evening at the study hour, or what should be termed the recreation hour, the pupils may be given fifteen minutes drill on sight reading from the chart and blackboard, the scales, tonic drill, and part singing.

It is not the desire of the Department to give advanced instruction in music, but it is intended to be taught more as a recreation, whose uplifting influence will be felt in the home.
NATURE STUDY.

In the lower grades of reservation and nonreservation schools we do not consider that the same amount of time should be given to nature study that the schools for white children give to it, for the reason that the Indian child is already fairly well equipped with this information.

The pupil should be taught facts about nature that are of practical use in everyday farm life, and he should be taught to make use of them. Without these practical lessons nature teaching is deprived of most of its power.

Nature study in its simplest form may begin as soon as a child enters school, for "nature is graded to every capacity," and in the kindergarten years it will very materially assist in the acquirement of English.

This study more than any other begins with the experiences of the Indian child and so furnishes the condition for that "interaction between the new idea and our stock of old ideas, which is the essential thing for education;" with him interest and observation have centered in nature, and these are roots alive and growing from which thought and speech will most readily spring.

As in other lessons the teacher should by preparation make herself interesting, and she should present the subject in such a way that the child will be led to conversation and investigation.

Definitions should be avoided and no study should be exacted. The lessons should be brief; ten minutes a day is a proper length of time.

In many of the schools, whether there is a distinct kindergarten or not, there are pupils of kindergarten age, with whom the teacher should seek to use practical kindergarten methods.

FIRST YEAR.

During the first year of the child’s school life only the most simple and elementary facts of nature study should be treated of. The teacher should talk only about things with which the child is already familiar, teaching him their English names and showing him facts about them that perhaps he has never before noticed, thus awakening a new interest and sharpening his powers of observation.

Wherever possible the work should correspond in some degree to the season, and this applies to the other years as well as the first. For example, at the beginning of the school year, in September, fruits,
grains, and plants maturing at that time should be talked about and examined with a minuteness varying with the grade. As this is also what may be termed the "seed" time, seeds may properly be talked about and the children directed to observe the various peculiar means by which they are distributed over the earth; how some have sails and rudders; others resemble little birds with their wings spread; and yet others are provided with hooks with which they take hold of the fleece of sheep or other animals. Collect and label seeds of all kinds. In October add to the collection the different kinds of nuts and leaves common to the neighborhood, and have the children observe and talk about them and kindred subjects. Encourage the children to watch the operations on the school farm, and in this connection it may be observed that in every year the work progressing on the school farm should be talked about and followed and used for illustrations whenever possible, having in view the fact that the child is to do this farm work himself when older.

Have allotted to each child a piece of ground for a little garden, which may be known as his "farm." At the proper season the boys should make small boxes to be used by each child for the planting of flower seeds indoors in the fall to beautify the rooms and to transplant in the garden in the spring. In other and larger boxes plant cabbage and tomato seeds, and when the plants are of sufficient size transplant to the garden. Each child should have the care of his individual boxes and also do the transplanting. His little garden he must also have spaded and raked himself under the direction of the teacher. By thus making him feel a responsibility for the care and appearance of his garden the sense of ownership will be fostered and a lively interest and spirit of emulation created. In the beginning the gardens should be small, gradually increasing in size with each succeeding year. Plant only lettuce, radishes, and onions at first. These, in addition to the flowers and the cabbage and tomato plants transplanted from the boxes, will be as many as these smaller ones can look after. It will be interesting when the seeds are planted in the ground to plant similar seeds on wet cotton indoors, that the children may observe the operations going on simultaneously in the ground. A section of the child's garden will be given to the flowers, many of them being transplanted from the boxes spoken of above. They must also be cultivated indoors. The vegetables and flowers grown should be marketed, the profits going to form the nucleus of a bank account. The plants growing on the child's farm may form the subject of short talks by the teacher.

Have the children collect and preserve such seeds as they can from their gardens for use the next year. This may be done with the tomatoes, radishes, lettuce, and possibly onions. Select only the
largest and most perfect tomatoes for this purpose, and keep only plump, healthy looking seeds. In the same manner, in preserving the seed from the lettuce and radishes, select only the largest and most prosperous plants, and for this purpose the largest plants in each bed must be left unmolested, while the others are taken for market or consumption. These seed plants need careful attention from the first. This will be excellent training for the children in the art of improving varieties.

The farmer should be called upon frequently to show the children the best manner of caring for their gardens.

The class-room teacher thus becomes a most valuable assistant to the farmer, giving the foundation, for which the farmer does not have time with the smaller pupils, and preparing the child to do more effectual work when he passes from the class-room teacher to the teacher of farming.

In talking about trees the wise teacher will choose the time when the child's attention is naturally directed toward them, as in the fall and spring. In this year little more need be done than teaching the names of the trees near the school and recognition of them by leaves and perhaps the colors of the blossoms, and the names and colors of the fruits.

Teach the children the English names of the wild animals with which they are familiar and the domestic animals at the school, and show them the distinction between them in their relation to man. Tell the children simple stories about animals, such as Æsop's fables, as a means of arousing their interest and sympathies. The uses of domestic animals may also be touched upon informally to advantage, and the children encouraged to talk about such animals as they may know of.

In insect study teach the names of a few of the insects common to the neighborhood, such as the butterfly, bee, ant, etc., and a little about their habits.

As for the birds, in these tender years of the child's life it is enough to teach it to love the birds and not to hurt them, nor to break up their nests, which are their homes. Tell the children how sad it is for the mother bird, who has been off getting dinner for her children, to come home and find them gone, and how unhappy the children are when a giant boy or girl steals them. Have the children learn the names of the birds of the neighborhood as they have those of the animals and insects, and ask them to notice the different ways in which each bird builds its nest. Encourage them to tell you about the nests they know of, the color, number, and size of the eggs in each, and show them how to observe the bird without frightening her. Then get up a little story about the Home in the Cedar Tree, or whatever tree the nest is built upon.
Children Gardening.
Bird houses should be built by the older boys with the aid of the carpenter. Have the children regard these houses as their own, and encourage them to observe closely the operations going on in them from the first coming of the birds in the spring to their departure in the autumn. They will afford the teacher many opportunities for appropriate and valuable talks to the children.

The subject of poultry is one of very practical value from the first year. The little children under the direction of the teacher will have the poultry in charge, raising only chickens the first year. This applies only to schools where poultry is not at present being raised, at which places it is desired that this industry be thus inaugurated. Where poultry is already being raised extensively, the children should be given charge of only a small portion, which must, if practicable, be separated from the rest. Have the children feed and attend to this portion of the poultry themselves, daily seeing that they are properly housed at night and that they are provided with sufficient water. Have them gather the eggs, occasionally giving them one as a recompense at the discretion of the teacher. At the proper time let them assist in setting the hen and attend to the little chicks. Encourage children to talk about them; their habits, etc. Give the boys the work of making little coops for the old hen and chicks and do such other light work as may be interesting. Impress upon them that the poultry are their special charge and dependent upon their care. The teacher will be able to find many ways by which the subject may be made interesting to the children, such as telling appropriate stories; and in this way the child will be given education of the utmost practical value.

At the proper season teach the children how to dry fruits, corn, etc., by having them assist in the actual work, giving them as large a share in it as possible.

SECOND YEAR.

This year the work is to be conducted on the same broad lines laid down for the first year, but upon an enlarged scale.

In the autumn direct the children’s attention to the preparation nature makes for winter. Discuss and have the children talk about the operations on the farm—harvesting, gathering of fruit, and storing for winter. Repeat the work of drying fruits, corn, peas, etc., giving all the work to the children, but directing them constantly. The teacher will preserve fruits and make jellies and jams, the children helping with the work, putting it away in small jars (vaseline or other) for the doll’s use. The doll’s home will thus be ordered as the child’s will be later.

Have the children gather such nuts as the neighborhood affords. Let each one retain the nuts he gathers as his own property, and if a sufficient quantity be collected, the child should be advised to sell them, adding the profits to his bank account.

Review what was learned about trees in the preceding year. In this
year the subject may be gone into a little more thoroughly, but always with the practical end in view. Teach the practical uses to which the trees of the neighborhood may be put and their commercial value. Teach the children what are the best fruit trees for the farm, such as the apple, peach, pear, etc., and something about their cultivation. Each child should plant one tree and carefully watch the same.

The child's farm must be continued as in the first year and considerably enlarged, but not so much as to be beyond the ability of the child to care for well, or so as to become an irksome task. Make the children collect and preserve such seeds as the school garden and their own produce for planting the next season. Show the children, with the help of the farmer, how to prepare their "farms" for the winter. Compare the results attained by the children and the appearance of their gardens, commending those which show evidence of enterprise and industry.

Repeat the planting in boxes and operations of the previous year, making additions to the varieties of flowers and vegetables planted. Give short talks on the parts of the plants and their functions, using those the child is raising in his garden as illustrations. With a little care, the children can raise a large share of all the cabbage and tomato plants needed for the school garden. Special attention should be given to the place selected for the boxes as regards light and also temperature.

Poultry.—What has been said on this subject in the first year will apply again. Give talks on interesting features of poultry and poultry raising. Encourage the boys to notice the different varieties or breeds and become familiar with their names. Once they begin to take a pride in favorite breeds and to dispute over their respective value, no urging in this direction will be needed.

The children will continue in charge of the poultry, under the direction of the teacher, as before, and ducks and turkeys may be added. Each grade may have charge of one variety. They require great care in raising, and but few should be attempted at first, so that what is done may be done well, and the young carefully looked after and fed and comfortably housed. The children will see that the nests and roosts are kept in good condition and the coops clean and well disinfected, for which purpose an occasional whitewashing of the inside will be valuable and also be good practice for the students.

Animal life.—Domestic animals.

Cows.—Different breeds. Milk and its uses. Explain to the children the forming of the cream, and have them watch the milk and observe how the cream collects on the surface. Show the children how to skim the cream, and then let them do it alone, using for the purpose an ordinary spoon, as the Indian in his home will probably have nothing better. Have a churn in the schoolroom and give the children actual practice in butter making. They can easily do the churning,
and will watch eagerly for the collecting of the butter. When it "comes" have them take it up carefully. Show them carefully the details of working out the milk and working in the salt and forming the butter into pats and prints. Each child will have a small bowl or tin pan large enough to work a small amount of butter in, and each will be provided with a butter paddle made by the boys. Monograms or designs may sometimes be carved in the top of the tiny cakes, which will be set away for the use of the doll’s table. See to it that when through all utensils are put away carefully and scrupulously clean.

**Horses.**—How useful. Teach that it is usefulness that gives value to an animal. Wild unbroken horses are of no value. The importance of the horse to the farmer, and the care that he should have. Suitable food for horses. Winter care. In this connection, emphasis should be laid on the proper methods of breaking colts, kind words and careful handling resulting in better-tempered and more tractable horses. The necessity of feeding regularly, protecting from the weather by always having a shelter from winds and storms, and of blanketing in extremely cold weather, should be impressed upon the pupils.

**Sheep.**—Uses. Wool. Care of sheep in winter and summer. Best pasturage for sheep. Teach that sheep will thrive on land on which cattle or horses would find scarcely enough food for bare subsistence. Illustrate, if possible.

**Swine.**—Value to the Indian farmer. Care. Feed and pen. Diseases and remedies.

**Wild animals.**—Those inhabiting the neighboring woods and mountains. Some characteristics. Their manner of living. Have the children tell about those they know of.

**In general.**—Teeth and feet of animals in relation to food. Weapons of defense. Different modes of drinking.

**Birds.**—In treating of birds teach the children the usefulness of birds. Those that kill destructive insects. Those birds that are undesirable and interfere with the work of the farmer. Have bird houses as in first year, and build more if desirable. Raise pigeons and have houses built for them.

**Insects.**—Teach the children those insects which destroy vegetation, taking illustrations from the work on the farm. Do not burden the child’s memory with the names of those other than can be seen in the vicinity. Ask the children to observe the remedies and methods used in dealing with these pests.

**THIRD YEAR.**

The work this year in nature study is to be somewhat more difficult and comprehensive, but never technical. The teacher must keep in mind that the result to be aimed at is the teaching of those things
which will be an aid to the Indian in practical life, especially in the line of agriculture.

By this time the child is old enough to be taught the several parts of every plant and their functions. With several plants before the class, teach that roots, stems, and leaves are what all plants have. Talk with the children about them until they are as familiar with the names and uses of these three parts of the plant as they are with the names and uses of hands and feet. Have them make drawings on the blackboard and write the name against each part of the drawing.

Teach also the flower; that without flowers we could not have wheat, corn, or fruits, but that flowers do not help the plant to grow; only roots, stems, and leaves do that.

Teach that the food which the roots take in is water and earthy substances which the water has dissolved; that roots grow while other parts of the plant grow and other roots are formed.

*Stem.*—Teach that the stem bears a leaf or pair of leaves at certain fixed places: that it hangs the leaves out to the sun and air, because the leaves must have light and warmth and air just as much as we, and the food which the stem gets from the roots it carries to the leaves.

*Leaves.*—Teach that they exhale moisture and take in air, which, together with what the stem brings them from the roots, they digest, and the whole plant grows.

Illustrate all these facts by plants from the child's garden, and apply the knowledge gained in the actual cultivation of the growing plants. A squash seed or a bean placed on wet cotton in a glass of water will also be of value for the purposes of demonstration. Observe the end of the little stem that turns and grows down into the earth and the other end which goes up toward the sun, and how the two seed leaves which were in the seed are brought up to the light and air. The seed has become a plant.

The teacher will give short talks on plant diseases; their nature and cause, and also their prevention, giving illustrations from the children's gardens, if possible, and also making experiments. Injurious insects; their methods of destroying plants; remedies for same. One of the most common of bugs that will cripple the plant and that must be destroyed is the potato bug. The fruit trees must be sprayed if we want good fruit. Wormy varieties will result if this is neglected. Trees are often destroyed by small caterpillars. The roots of fruit trees should be looked after. Worms collect and sap the life of the roots.

Continue the lessons on seed planting, going into the work more extensively. The progress of the work in the gardens should by this time have reached a point where the children will be quite proficient in the cultivation of many vegetables that can be raised in the climate of their respective schools. Too much emphasis can not be placed on the importance of this work in gardening. Everything possible must
be done to make these practical lessons interesting and helpful. As the strength and experience of the boy increases each year he takes a little larger plot of land and cultivates a greater variety of vegetables. Where the children started with radishes, lettuce, and onions we now find them raising beans, potatoes (sweet and white), tomatoes, simlins, melons, small fruits, such as strawberries, etc., sweet corn, beets, and many other things. A spirit of competition and friendly rivalry for the honor of the most productive and neatest garden should be encouraged.

Sufficient corn should be planted to supply the demands for drying, etc. In this connection fruits should be canned as well as dried. Tomatoes, corn, peaches, apples, or whatever is available must be put up for winter. The best housewife is the one who looks to the future, and by carefully drying, preserving, pickling, and canning all the vegetables, fruits, meats, etc., in the fall provides a pleasant variety for her table during the winter when nature is resting. The lesson that those who work hardest are the best paid is learned in a most practical way.

The child must be continually taught the value of thrift. Seeds must therefore be saved in the fall for planting in the spring, fruits and vegetables that would otherwise go to waste must be preserved for the winter, and the profits at the end of each season must be put away either for a bank account or for improving the land the next season and purchasing tools, etc., whereby better crops may be raised and the annual profits correspondingly augmented. The thrifty farmer will not spend a large sum of money each year for seeds, but will save many kinds the year before. If he is wise he will select the seeds of the sweetest melons, the finest tomatoes, and the largest ears of corn. Have the children raise their own onion sets the latter part of each summer. Lettuce and radish seed must also be saved and labeled each year for next season’s planting.

There are many varieties of flowers that can easily be raised from seed, as the petunia, portulacca, zinnia, flox, canna, and mignonette, all of which are especially fine for bees. Thus, with a little care and daily watering, the school grounds will be beautified, the aesthetic nature of the children cultivated, and the bees provided with a little food.

Grafting and budding.—Full directions for grafting and budding will be found in pamphlets in the school library.

An effort has been made to make the following lessons strictly practical, because of a desire to emphasize this too often neglected side; and to show how, in a simple way, agricultural lessons of great value may be taught.

Fruits.—With one variety at a time on the desk. Name; color; where it grew; in what month the tree blossomed, and how long it has taken the fruit to grow.
Kind.—Whether fleshy fruit, stone fruit, berry, nut, grain, or pod.

Skin; pulp; seeds; use.

Make a drawing of each tree whose fruit is being studied and appropriately color each part.

Compare the shapes of the different fruit trees.

Teach how to dry fruits, as apples, etc. Make a collection of dried fruits and label them. Save the seeds of the fruits studied and plant them.

Seeds.—From fruits just studied.

Food in the seed for the young plant. Tear open an ear of green corn and see the milk which is being prepared to feed the new plant if the seed is ever planted. The whole plant goes to work to make this milk. All children know about the sweet juice in the stock or stem of corn, and sometimes they get sugar cane, which has a much sweeter juice. The sap of the sugar maple tree is the same thing stored for the same purpose.

Ask the children to tell about the “pan noche” which their mothers make by sprouting the wheat, then quickly drying it before the sugar is eaten up by the plant: ask them if it is not very sweet.

Teach that the reason many seeds are used so much for feeding people and animals is because of the food stored up in them for the use of the young plant, and that in this way nearly all the food of men and animals grows out of the ground.

Stems.—Teach that they grow joint by joint, each from the top of the last one.

Branches.—Ask the children to bring twigs having several branches, and by the specimens and blackboard work train them to a clear understanding of what a branch is, how it grows from the side of the stem and comes out nearly always from the axil of a leaf.
Branches are first buds, and buds are stems or branches that have not yet grown, but the very small leaves are there.

Propagation of plants.—We have seen how plants grow; now let us study the way in which they multiply. All plants may be propagated by seeds or what answers to seeds; besides this, many propagate naturally from buds. Almost any tree may be made to propagate in this way.

Fourth Year.

The class-room teacher will be able to interest the pupils in nature work from the start by introducing them to plant life, soils, and insects; showing the relations existing between them and their interdependence. Observation (occasionally in the field) every day in the class-room by experiment, talks, and written exercises. The following work as outlined by Prof. C. L. Goodrich, the eminent teacher of agriculture at Hampton Institute, will be of great assistance to the teacher this year.

First, showing them the principal parts of the plant and how these parts grow, what they do for the plant; the conditions necessary for each part to make its best growth and to do its best work for the plant and for man; and how to bring about these conditions on the farm.

Next, the relation of soils to plants; how soils are made, the work of sun, water, air, ice, plants, and earthworms in making soils; soil conditions which affect plant growth; relation of soil to water, heat, and air; plant food in the soil; how to bring about and maintain soil conditions which favor plant growth.

The general structure, metamorphosis, and habits of insects common on the farm.

As half of the people of the United States are occupied in producing from the soil directly, and as the prosperity of our country as a nation among nations depends upon what is produced, the question is often asked: "What is the country doing toward training this half of the people for their life work in that art on which the prosperity of the country depends?"

Every State has its agricultural college and experiment station, but what are the teachers in the Indian Service doing toward training the Indian toward the proper care and best development of the farm which the Government has allotted him? Professor Goodrich says: "The farmer works daily with plants, with animals, with the soil, with tools, and machines, yet he knows little about the growth and development of these plants and animals, and not much about the soil; very little about the forces which control them in their relation to each other, almost nothing about these forces. And yet his success or failure depends on the degree to which the operations he performs in working with the soil, in growing his crops, and caring for his stock are in harmony with
these forces and the laws governing them. The signs of the times indicate that agriculture will soon be taught in every one of the common schools. Nature teaching, the forerunner of agriculture teaching, is widely engrossing the attention of the teaching world. New York State spends a large amount of money annually for the introduction of nature study into the common schools, having in view the bettering of her agricultural population. Missouri has passed laws making the teaching of agriculture in the common schools compulsory."

The pupil should be taught facts about nature that are of practical use in everyday farm life, and he should be taught how to make use of them.

"Plants and soils.—Visit with the pupils one or two neighboring farms; have the pupils observe and make note of as many things as possible. Talk about them and, if possible, get the farmers to talk about them.

"At the end of the excursion, or the next day, ask for the names of the objects observed, and classify them under the headings: Plants, animals, soils, tools, and machines. It is these with which the farmer works, and with these he should be well acquainted to make the best success at his occupation.

"Starting with plants; go to the field again or be provided in the classroom with a number of farm plants: say corn, cowpea, beet, turnip, parsnip, carrot, onion, grass, marigold, geranium, or other flowering plants. Get the entire plant, with as much root as possible. Hang these on the wall or blackboard, or arrange them on desks or tables.

"Do these plants in any way resemble each other? All these are green; all have roots, stems, and leaves; some of them have flowers, fruit, and seeds; and others in time produce them.
"Why does the farmer raise these plants? Classify answers under the following heads: Food for man; food for animals; clothing, pleasure, ornamental purposes, etc.

What parts of each of the individual plants are used for these purposes?

What parts of other plants are used for the same purposes? (At this point we might branch off into commercial geography, studying the plant productions of the town, county, State, or the country at large.)

Are the root systems of these plants all alike? Are the stems all alike—the leaves, the seeds? Draw attention at this time particularly to the root systems, noting that some consist of a cluster or bundle of fibrous roots, others have a central taproot, and in some this tap-
sharp sticks and working the soil away from a few of the roots, following them as far as possible. This will be excellent work for the pupils. Now study these roots and find out the following points: Are they fibrous or taprooted systems? Are they coarse or fine? What is their direction or growth? Are they branches? Are they long or short? How deep do they go? In what part of the soil do you find most of them? Why? How near the surface do they come?

"It will be found that some of the roots penetrate to depths of from 4 to 6 feet, but that the majority of the roots of each plant are in the upper 12 inches, or in that part of the soil which has been worked with tillage tools. Has this fact any bearing on the preparation of soil for plants? Yes. The deeper and better the soil is worked, the greater the body of soil in which there will be conditions which favor the development of a large and vigorous root system and consequently a strong plant. (Many farmers are ignorant of this fact.)

"It will be found, also, that many of the roots of most plants come very near the surface of the soil. Has this any bearing on the methods of aftercultivation? Yes. Aftercultivation should be shallow or the tools will destroy many of the feeding roots of the plant. Careful thought and study will bring out other facts bearing on the care of the plant.

"Where does increase in the length of root take place?

"Place some kernels of corn or other large seeds between the folds of a piece of wet cloth. Keep the cloth wet till the seeds have sprouted and the young plants have roots 2 or 3 inches long. Have at hand two panes of glass about 5 by 8 inches, a piece of cloth a little longer than the width of the glass and about 3 inches wide, a spool of dark-colored thread, and a shallow pan or dish. Lay the pane of glass in the pan, letting one end rest on the bottom of the pan and the other on the opposite edge of the pan. Wet the cloth and spread it on the glass. Take one of the sprouted seeds, lay it on the cloth, tie pieces of thread around the root at intervals of one-fourth inch to an inch; tie carefully so that the root will not be injured. Place the second pane of glass over the roots, slipping in a sliver of wood to prevent crushing them, and letting the upper edge of the glass come just below the seed. Fold the corners of the cloth about the seed, put half an inch of water in the pan, and leave for developments. A day or two will show conclusively that the lengthening takes place at the tip only. Has this fact any bearing on the relation of soil texture to root development? Yes. The soft, tender root tips will force their way through a mellow soil with greater ease and rapidity than through a hard soil, and the more rapid the root growth the more rapid the development of the plant. Here, again, is the lesson of deep plowing and thorough breaking and pulverizing of the soil before the crop is planted.

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"Uses of roots to plants."—They hold the plant firmly in place. Let the pupil prove this by pulling up a few plants and telling why every wind does not sweep all plants before it.

"Roots absorb plant food from the soil."—Let the pupils prove this by observation of crops growing in good soil and crops growing in poor soil; or start seeds of corn in sand and garden soil some time before this question comes up. Bring out the necessity of a plentiful supply of available plant food for the rapid development of the plant.

"Roots absorb moisture from the soil."—Have the pupils prove this by neglecting to water potted plants, or by cutting growing twigs of plants, putting some of them in water and leaving others without water.

"How does the root take in moisture and plant food?"—Show fuzz or mass of root hairs near the ends of the tender roots of seedlings started in folds of damp cloth. Then pull up young plants growing in sand and show how closely the root hairs cling to the soil particles. The root hairs are absorbing moisture laden with food from the surface of the soil particles. The moisture gets into the roots by a process called osmosis. Illustrate osmosis as follows:

"Experiment."—Procure a wide-mouthed bottle full of water, in which a small lump of salt has been dissolved, an egg, and a glass tube 4 or 5 inches long and a quarter inch or less in diameter. Carefully remove the shell from a part of the large end of the egg without breaking the lining, skin, or membrane. Make a hole in the small end of the egg, through shell and membrane, large enough to receive the glass tube. Insert the tube in this hole, letting it enter about half an inch, and cement it in place with a piece of softened wax or tallow candle; make the joint perfectly tight. Now place the egg on top of the bottle, which should be full to overflowing with water, and wait for results. In an hour or so the white of the egg will be seen rising in the glass tube, because the water is making its way into the egg through the skin which has no openings so far as can be found out with the most powerful microscope. This is the way water, laden with plant food, enters the slender root hairs of plants.

"Roots sometimes store food for the future use of the plant."—Have the class bring in specimens of fleshy roots and test them with iodine to show that this stored material is starch.

"Of what use is the stored material to the plant?"—Obtain, if possible, a fleshy root made flabby or pithy by second growth—a turnip or beet planted the second season and allowed to go to seed will show this—or a few radish seeds may be planted; they will produce fleshy roots four or five weeks and will then produce a seed stalk, and as this grows and the seeds ripen, the root will lose its stored food and become flabby and pithy.
"The roots of plants will not grow without air.

"Experiment.—Take two wide-mouthed bottles, one nearly full of fresh water from the well or hydrant; fill the other nearly full of water that has been boiled to drive the air out of it; place in each bottle a cutting of wandering jew (also called inch plant, and tradescantia) or some other plant that roots readily. Then pour on top of the boiled water about one-fourth of an inch of lard-oil, oil, or cottonseed oil. The oil is to keep the air from the water. In a few days roots will appear on the slip in the fresh water, which contains air, while none will develop in the boiled water, which contains no air.

"Another experiment.—Plant some corn or beans in moist sand and some in clay that has been wet and worked till it is a soft paste; cover each with a piece of glass and set in a warm place to sprout. If the clay cracks from drying, moisten the surface and close the cracks. It will be found that the seed will not sprout in the clay because there is no ventilation.

"What then does the root require for its best development and to do its work well? A fine mellow soil; a moist soil; a well-ventilated soil; a soil well supplied with plant food.

"This is a good place to take up the study of soils.

FIFTH YEAR.

SOILS.

"Excursion.—Take the class to the fields to see soils in place. Examine as many kinds of surface soils and subsoils as possible, also compost heaps, decayed leaf mold, etc. Collect samples of these soils and bring to the class room.
"The soil, considered agriculturally, is that part of the earth's crust which is occupied by the roots of plants and from which they absorb food and moisture.

"Relation of soil to plants.—We have learned that plant roots penetrate the soil to hold the plant in a firm stable position, to absorb moisture, and with it plant food. We learned also that for the roots to do these things well the soil in which they grow must be mellow and porous, must contain plant food and moisture, and air must circulate in its pores.

"How can we bring about these conditions?—To answer this question intelligently it will be necessary for us to study the soil to find out about its structure, its composition, its characteristics. Also how it was made and what forces or agencies were active in making it. Are these forces acting on the soil at the present time? Do they have any influence over the conditions which are favorable or unfavorable to plant growth? If so, can we control them in their action for the benefit or injury of plants?

"Experiment.—Place in separate pans, dishes, boxes, or on boards, about two quarts each of sand, clay, decayed vegetable matter or humus, and garden soil. Note the color of the first three samples, whether or not they are light or dark, and whether or not they are moist. Test for comparative size of particles by rubbing between the fingers and for stickiness by squeezing in the hand.

"Experiment.—Take two wide-mouthed half-pint bottles; fill each nearly full of water; put in one bottle about a tablespoonful of sand and in the other a tablespoonful of clay; shake thoroughly and let settle. The sand settles quickly and the clay very slowly.

"We find, then, that—

Sand is light in color, moist, coarse, not sticky.
Clay is darker in color, moist, very fine, very sticky.
Humus is very dark in color, moist, very fine, slightly sticky.

"We are now ready to make a simple analysis of soils.

"Experiment.—Repeat the last two experiments, using garden soil. We find, perhaps, that it has fine particles and coarse particles; is moist, sticky, and colored; therefore it contains sand, clay, and organic matter, or humus. Test several field soils in the same way.

"Experiment.—Take the four pans of soil used in experiment above; divide the soil in each pan into two equal parts; wet one-half of each and stir it with a stick until a stiff mud is formed, then pour the same amount of water on the remaining half of each soil, but do not touch it with anything. Let the pans alone until the soils dry, and in the meantime study the classification of soils and something about the origin and formation of soils.
Soils are classified as follows:

Loam, composed of about equal parts of sand and clay, with some organic matter.

Sandy loam, in which there is more sand than clay.

Clay loam, in which there is more clay than sand.

Clay soil, composed largely of clay.

Sandy soil, composed largely of sand.

Humus, or organic soil, composed largely of decayed organic matter, such as the black soil of swamps, decayed leaves, woods, earth, etc.

How soils are made.—We know that rock salt will dissolve readily in water, limestone is harder and dissolves slowly in water, brick crumbles easily, quartz and granite being very hard. The whole crust of our earth was once formed of these and other rocks which have been broken down into coarse and fine particles, forming gravel, sand, and clay. Decaying plants and animals have added the organic matter to the soil.

Rain falling on rocks may dissolve them as water dissolves rock salt, or, working into the small cracks, may wash out particles loosened by the sun, or during cold weather it may freeze and by its expansion cause the cracks to become wider or may chip off small pieces, or getting into large cracks and freezing, may split the rock just as the freezing water splits the water pitcher or the water pipes.

The work of moving water can be seen in almost any road or cultivated field during or just after a rain, and particularly on the hillsides, where often the soil is loosened and carried from higher to lower parts, making barren sand and clay banks of fertile hillsides, and destroying the fertility of the bottom lands below. Many a farmer has helped the work of destruction by cutting the forests from the hilltops.

The work of plants.—Living plants sometimes send their roots into rock crevices. There they grow, expand, and split off rock fragments. When plants die and decay they keep the surface of rocks moist and also produce acids which dissolve the rocks just as the vinegar dissolves limestone.

Dead and decaying roots, stems, and leaves of plants form largely the organic matter of the soil. We find large amounts of this organic matter in the woods, on the prairies, and in the swamps. When this organic matter has undergone a certain amount of decay these soils are called organic soils or humus soils.

Soil properties which affect plant growth.

Texture.—We have seen that for the best development of the plant the particles of the soil must be so arranged that the delicate rootlets can readily push their way about in search of food; or, in other words, the soil must have a certain texture. By the texture of the soil we mean the relation of its particles to each other. The following terms
are used in describing soil texture; write them on the blackboard: Course, fine, open, close, loose, hard, stiff, compact, soft, mellow, porous, leachy, retentive, cloddy, bumpy.

"Which of these terms will apply to the texture of sand; which to clay; which to humus; which to garden soil; which to a soil which plant roots can easily penetrate?

"We find, then, that the texture of soil depends largely on the amount of sand, clay, or humus that it contains.

We have learned that roots take moisture from the soils; that the soil receives moisture from the clouds, in the form of rain, and from the lower soil.

"Free water, which flows under the influence of gravity. It is the water which fills our wells, is found in the bottoms of holes dug in the ground during wet seasons, and is often found standing on the surface of the soil after long-continued rains. (Illustrate by making a miniature well in a pail or glass jar if no well is near by.) Free water is not good for the roots of plants. Illustrate by planting seeds and growing plants in very wet soil.

At this point a few simple lessons may be given on drainage or methods of getting rid of surplus free water.

"Experiment.—Take four flower pots or tin cans with holes in the bottom. Fill them nearly full, respectively, of dry sifted sand, clay, humus soil, and garden soil. Place them in a pan or dish. Pour water on them until it drips from the lower end. We find that sand takes the water in and lets it run through very quickly; clay is very slow to take it and let it run through; humus soil takes it quite readily. Have one can with clay packed in and one containing loose clay. Water will penetrate the loose soil more readily than the packed soil.

"We now see that the power of the soil to take in moisture depends on its texture or the size and compactness of its particles.

"What can we do for our clay soils to help them absorb the rain?—For immediate results, plow them and keep them loose with tillage tools; for more lasting results, mix organic matter with them by plowing in farm manures or growing crops and turning them under. Sand may also be applied, but it is not always to be obtained, and is expensive to haul.

"By experiment we find that the power of soils to take moisture from below depends on their texture or the size and closeness of the particles.

"What can we do for our sandy soils to give them greater power to take water from below?—For immediate results, compact them by rolling; for more lasting results, fill them with organic matter in the shape of barn manures or crops turned in. Clay may be used, but it is expensive to haul.

"It will be found that organic soil will hold a much larger percentage of water than the other soils, and clay much more than sand.
What can we do for our sandy soils to help them to hold better the moisture which falls on them and tends to leach through them? For immediate effects, compact them with the roller; for more lasting effects, fill them with organic matter.

We find that the power of soils to absorb and hold moisture depends on the amount of sand, clay, or humus which they contain and the compactness of the particles. We see, also, how useful organic matter is in improving these soils.

By this time the soils we left in the pans must be dry. If so, examine them, and we will find that the clay which was stirred when wet has dried into an almost brick-like mass; while that which was not stirred is not so hard, although it has a thick, hard crust. The sand is not much affected by the wetting and stirring. The organic matter which was stirred has stiffened a little, but the unstirred part was not much affected by the wetting and drying.

The garden soil is not as stiff as the clay nor as loose as the sand and humus. This is because it is a mixture of all three, the sand and the humus checking the baking. This teaches us that it is not a good plan to work our soils when they are wet if there is much clay in them, and our stiff clay soils can be kept from drying hard by the use of humus.

The figure illustrates in a simple way the value of organic matter in the soil. The boxes were filled with a clay subsoil. Then to the second one was added enough fertilizer to supply all the needs of the plants; and to the third was added some peat or decayed vegetable matter, and the corn was then planted.

The better growth of the corn in the third box was due to the fact that the organic matter not only fed the corn, but it also brought about much better conditions for the corn by improving the texture of the soil.

Power to absorb and hold heat.

Experiment.—Some days before this experiment, spread on a dry floor about half a bushel each of sand, clay, and decayed leaf mold or
black wood soil. Stir them occasionally until they become thoroughly dry. When they are dry place them separately in three boxes or large flowerpots and keep dry. In three similar boxes place wet clay, wet sand, and wet humus. Place a thermometer in each of the soils, and then on a bright day set the boxes out of doors, where the sun can shine on them, and leave them two or three days. If a rain should come up, protect the dry soils. Observe and make a record of the temperatures of each several times a day; certainly, early in the morning, early in the afternoon, and at night. Chart one day’s observation or the average of several days on the blackboard. Show the average temperature of wet and dry soils for five days. Of the dry soils the humus averaged the warmest, because, on account of its dark color, it absorbed heat more readily than the others. The dry clay was warmer than the sand on account of its color and compact texture. Of the wet soils, the sand was the warmest, because, on account of its holding less water, there was less cooling by evaporation; while the other soils, although they absorbed more heat than the sand, lost more on account of evaporation.

"Why are sandy soils called warm soils and clay and humus soils said to be cold soils?"

"Plant food in the soil.—We have learned that the roots of plants take food from the soil; therefore, it is necessary that the soil be supplied with this food and that it be in such condition that the plants can use it. What is plant food? For answer, go to the plant and ask it what it is made of.

"Newly ripened cotton, or cotton wadding, branches of trees, cornstalks, or straw all contain long tough fibers. These fibers are called woody fiber, or cellulose."

"A drop of iodine turns starch purple or blue. Apply a few drops of weak tincture of iodine to the cut surfaces of white potato, sweet potato, parsnip, broken kernels of corn, oats, and wheat. This experiment shows that these plants contain starch."

"Chew pieces of sorghum cane, sugar cane, cornstalk, beet, or watermelon. They are all sweet; therefore, they contain sugar."

"You will find on peach and cherry trees more or less of a sticky substance called gum."

"Crush on paper seeds of cotton, castor beans, peanuts, brazil nuts, hickory nuts. They make grease spots; therefore, they contain oil."

"Chew whole grains of wheat and find a gummy mucilaginous substance called wheat gum, or wet a pint of wheat flour to a stiff dough, let it stand about an hour, and then wash the starch out of it by kneading it under a stream of running water or in a pan of water, changing the water frequently. The result will be a tough, yellowish, elastic mass called gluten. This is an albuminoid, so called because it contains albumen, a substance like the white of an egg."
"Now, more or less of all these substances—cellulose, starch, sugar, gum, oil, and albuminoids are found in all plants. The plant does not get these materials from the soil, but gets some of the substances of which they are made from the soil. These substances are nitrogen, sulphur, phosphorus, potassium, calcium, magnesium, and iron.

These substances must not only exist in the soil, but must also be there in such a form that the plants can use them. The plant does not use them in their simple elementary form but in various compounds. These compounds must be soluble in water or in weak acids.

"Of these seven elements of plant food, the nitrogen, phosphorus, and potassium are of particular importance to the farmer, as they do not always exist in the soil in sufficient available quantities to produce profitable crops. An average soil contains 3,000 pounds of nitrogen to an acre. This nitrogen exists largely in the humus of the soil, and it is only as the humus decays that the nitrogen becomes available (is made available). Here is another reason for keeping the soil well supplied with organic matter. The decay of this organic matter is hastened by working the soil; therefore, good tillage helps to supply the plant with nitrogen. If this nitrogen becomes available when there is no crop on the soil, it will be washed out by rains and so lost. Therefore, the soil, especially if it be sandy, should be covered with a crop the year through. Many lands lose large amounts of plant food by being left bare through the fall and winter, especially in those parts of the country where the land does not freeze. The phosphorus and potassium also exist in most soils, but often are not available. Thorough tillage and the addition of organic matter will help to make them available, and new supplies may be added in the form of fertilizers.

"Bacteria in the soil.—There exist in the soil very many small plants. They are so small that it would take 3,000 medium-sized ones to reach across the edge of this sheet of paper; we can not see them with the naked eye, but only with the aid of lenses that magnify many hundred times. These small plants are great friends to the farmer, for it is largely through their work that food is made available for the larger plants. In fact, we could not grow crops without them. To do their work they need warmth, moisture, air, and some food. These conditions we bring about by improving the texture of the soil by means of thorough tillage and the use of organic matter.

"If in these simple lessons we can impress upon the pupil (1) the importance of deep and thorough preparation of the soil; (2) the importance of keeping the land covered with crops the entire year in moist regions to prevent the loss of food plant; and (3) the importance of keeping the soil well supplied with organic matter, the lessons will be well worth the effort, for these are some of the important points neglected by our farmers through ignorance of their value.
Review plants, soils, etc., as presented in the fifth year.
Teach farm accounts and business forms.

THE CROPS.

What is raised on the school farm? What on the land owned by the parents of the pupils? Give talks on marketing crops and their comparative value.

Corn.—Its history; a native of South America; it is also found wild in the mountains of Mexico. Columbus found it in cultivation when he first landed in Cuba. The colonists on James River and the Massachusetts colonists raised large crops, imitating the methods of the Indians.

Corn has but one seed leaf. The flowers containing the pollen are at the top of the cornstalk, and the pollen is shaken down upon the pistulate parts below. Corn sometimes has aerial roots—that is, roots growing from the joints of the stem. People used to make a hill about the roots of the corn, but because of these aerial roots they now avoid hilling. Care is taken to keep the soil well hoed, loose, and free from weeds. Corn quickly shows the effects of good soil; it grows best in a light, rich soil, with hot weather and frequent showers. Readily adapts itself to almost any climate. In Canada is a kind that grows to a height of 2 feet and matures in a few weeks’ time, while in places where summers are longer it grows much taller. Diversity of climate has given rise to many varieties.

Nature as food.—Contains much oil; therefore is of much value as a winter food. Some kinds are rich in phosphates.

Uses of corn.

Wheat.—Original country unknown. Cultivated from remotest antiquity. No other cereal possesses so many qualities that render it suitable for food.

Uses of wheat and wheat straw.—For man; for animals.

Seed, how improved. A highly intelligent practical wheat grower selected wheat on the following plan: Choosing the best and most productive plant, he planted the grains from it in rows, 12 inches apart every way, and so arranged that the grains from each head or ear should be in a row by themselves. At harvest he selected from these, after careful study and comparison, the finest plant—that which had tillered most and produced the finest, largest, and fullest ears. This process he repeated for four or more years, the improvement being at first rapid, but after a series of years having apparently reached its limit. In five years the number of grains to the ear increased from 47 to 123. From various observations and experiments he deduced the following laws of the development of cereals:
1. Every fully developed plant, whether of wheat, oats, or barley, presents an ear superior in productive power to any of the rest on that plant.

2. Every such plant contains one grain which upon trial proves more productive than any other.

3. The best grain in a given plant is found in its best ear.

4. The superior vigor of this grain is transmissible in different degrees.

5. By repeated careful selection the superiority is accumulated.

6. The improvement, which is at first rapid, gradually, after a long series of years, is diminished in amount, and eventually so far arrested that, practically speaking, a limit to improvement in the desired quality is reached.

By still continuing to select, the improvement is maintained and practically a fixed type is the result.

*Other cereals.*—Rye, oats, barley, rice.

*Grasses.*—Kinds, including different clovers and alfalfa; use, how prepared for winter and value at that time. What kinds best for sheep; what best for cattle.

*Vegetables,* including roots and tubers. Kinds grown on school farm and other farms in neighborhood. How necessary as food for man; as food for animals.

*Plant diseases.*—Cause and remedy.

*Injurious insects.*—Their nature and methods of destroying plants. Insect remedies.

**SEVENTH YEAR.**

Review work of plants and soils as taught in fifth and sixth years.

*Soils.*—Nature of. Why is one field better than another for a certain crop?

Causes of difference in soils, as drainage, fertilization, sunshine. Talks on the use of plows, harrows, and rollers.

Plowing. Teach that the best practical farmers practice frequent deep plowing, in order to admit the air and moisture to the roots, besides loosening the soil so the roots can travel. If soil from being very stiff does not allow roots to spread, the roots can not reach the substances which they require as food.

Air and water are needed in the ground to render soluble and available the mineral constituents of the soil. This effect is called “weathering.” Stagnant water which excludes air is an obstacle to weathering. This weathering is usually accomplished by plowing deeply in the fall and allowing the land to remain until spring without further cultivation. The ground thus roughly broken is in a very advantageous condition for the action of the air and water, and in cold climates the
frost also has a very beneficial effect. As said before, stagnant water is an obstacle and must be drained off.

Harrowing should be deep and thorough, to accelerate the formation of plant food in the soil and also to prevent excessive evaporation.

Cultivating between rows, as in corn and potatoes, should be done in such a manner as not to cut off or break the roots of the plants, but merely to loosen the ground to enable the roots to spread and to admit air, and also to destroy weeds.

Rolling is done for the purpose of crushing lumps and pulverizing the ground, and also to prevent the ground from drying out rapidly.

Irrigation.—One of the most ancient appliances of agriculture. By means of it land otherwise unproductive has been made to furnish sustenance to large numbers of people. When the Spaniards first visited Arizona, in 1526, they found ruins of cities and irrigating canals which indicated that it had been densely populated by a people who subsisted by agriculture. In Mexico they found "a perfection of horticulture at that time unknown in Europe." All the warm countries bordering on the Mediterranean, and even England, resort to irrigation. The irrigating season in England is the colder portion of the year. The people say that by judicious irrigating, the cutting of hay, and turning in of sheep and cattle common pasture has been converted into the best of mowing.

The perfection of irrigation is when it is combined with thorough underdraining. There is then a healthy system of circulation going on. The college of agriculture connected with Cornell University in one of its leaflets gives some valuable information on "How to save water in the soil," from which the following is quoted:

If you learn that much, you will know more than many old farmers do. You know that the soil is moist in the spring when you plant the seeds. Where does this moisture go to?

It dries up; goes off in the air. If we could cover up the soil with something, we should prevent the moisture from drying up. Let us cover it with a layer of loose dry earth. We will make this covering by raking the bed every few days, once every week anyway, and oftener than that if the top of the soil becomes hard and crusty, as it does after a rain.

Instead of pouring on the bed, therefore, we will keep the moisture in the bed. If, however, the soil becomes so dry in spite of you that the plants do not thrive, then water the bed. Do not sprinkle it, but water it. Wet it clear through at evening; then in the morning, when the surface begins to get dry, begin the raking again to keep the water from getting away. Sprinkling the plants every day or two is one of the surest ways of spoiling them.

Underdraining.—This consists in burying beneath the soil in a proper manner a series of pipes so made as to be capable of receiving from the soil any surplus of water it may contain and leading it to lower points, whence it may be discharged.
Millions of acres of apparently valueless land have been rendered capable of profitable cultivation by underdraining. Underdrained soils do not as quickly suffer from drought.

_Fertilization._—Teach how crops exhaust soils and that they need to be artificially enriched. Teach value of farm and barnyard manures, composts, green-crop manures, and commercial fertilizers.

Land often seems worthless which experiment proves valuable.

In the eastern part of the State of Washington the soil is a light-colored loam, containing a large percentage of alkalies and fixed acids. Sowing wheat there seemed throwing it away, but experiment showed that these are among the best wheat fields in the world. Winds often cover up good soils with sand dunes.

Often all that a sterile soil needs is treatment with some mineral which nature has placed near at hand. Perhaps this mineral was once in the soil, but the crops that were raised there took it all away. There are many things locked up in the rocks which the plants need for food, and under the slow action of the atmosphere and other causes they are gradually rotted down, and the streams wash the soil into places which need it for fertilizing the crops.

Old soils which have been properly treated with fertilizers may be more fertile than new ones.

Kinds of fertilizers used to enrich ground: Farm manure, wood ashes, bones and bone dust, lime and lime combined with salt, decayed animal and vegetable matter.

Rotation of crops: Teach that one plant will take what it needs from the soil, but leaves there what other plants require.

It is a matter of common knowledge to most farmers that when a certain crop is planted on the same ground for several successive years the yield grows less with each year; but many of them do not know the reason of this, do not take the trouble to find out, and hence do not know the proper remedy to apply. For instance, among this class of unprogressive farmers, hay is produced from the same field for unnumbered years, and they wonder why it gradually declines. The answer is simple. Each crop draws a large amount of a special element or elements from the soil, and naturally if repeatedly planted in one place soon exhausts that element. The remedy, of course, is to plant some other crop which does not require any considerable amount of the depleted element, thus giving the soil a chance to recuperate in that particular respect. For example, potatoes require much potash and little phosphoric acid, while wheat needs little potash and much phosphoric acid. Therefore a crop of potatoes might well be followed by wheat, and where a farmer one season grew potatoes in one field and wheat in another he should have the wheat and potatoes change places the following year. And so it is with all crops. Of
course, to practice rotation of crops most intelligently and successfully, the farmer should have a working knowledge of the elements going to make up the principal crops and their relative proportion in each.

This is a very important subject, and the teacher should enlarge upon it with the aid of the excellent works on agriculture in the school library.

The general structure and composition of the animal body, care of farm animals, kindness to them, and proper attention to their food and to their comfort.

The leading breeds of farm animals.
THE OUTING SYSTEM.

It is the earnest wish of the Department to extend to every reservation and every school where the conditions are favorable the system known as the "Carlisle Outing System." Its value as a means of educating and elevating the Indian can not easily be overestimated, and the Department desires that every Indian agent and school superintendent carefully investigate and consider the conditions surrounding his school, to ascertain whether it be practicable to put this plan into operation; and if so, that he proceed at once to take steps to place a number of the school children among the citizens of the locality.

The Carlisle Outing System, briefly stated, consists in the placing of the Indian pupils in good white families, preferably in the country, during a portion or all of the year, where they will be treated as one of the family, made to attend the public school of the district while it is in session, and paid a small sum for their services. The pupils clothe themselves and pay their other necessary expenses, and the school makes provision for taking care of their savings. The spring and summer months are the most desirable for sending the children out, but many of them should be kept out at all times of the year.

This method has now been in operation for many years, and wherever tried, it has proven remarkably effective.

Its chief advantages are as follows:

It places the student under the influence of the daily life of a good home, where his inherited weaknesses and tendencies are overcome by the civilized habits which he forms—habits of order, of personal cleanliness and neatness, and of industry and thrift, which displace the old habits of aimless living, unambition, and shiftlessness. It places him in the midst of the stir of civilized life, where he must compete with wide-awake boys and girls of the white race; it gives him a free and ready command of English; it teaches him the worth and value of labor and its remuneration, and by saving his earnings, trains in habits of economy and prudence; it teaches him how to conduct a farm or dairy in the most practical manner; and last, it removes the prejudice between the races by showing each to the other in its true light.

At the same time that the pupil's life on the farm gives him a knowledge of agriculture, it trains him in the work habit. He sees and takes part in the farming operations from beginning to end. He
helps, in the early spring, to burn the rubbish and clean the fields and
garden; then assists with the plowing and preparing of the ground;
takes an important part in the planting of the seed, the cultivation of
the crops, and finally in harvesting and preparing for the winter. He
is also actively engaged in the picking and storing of fruit, in caring
for the domestic animals, and in the work of the dairy. In fact, he
receives a thorough training in every one of the innumerable details
with which a successful farmer must be familiar.

After a few years' experience of this kind the boy will be more able
to return to his home and conduct a farm in all its departments, and
his home life during his outing will have fitted him to provide and
arrange a home and live in it as the people do at the home he has just
left.

The same is true with the girl. She is trained in the practical every-
day life of the household; gains the ability to cook, to sew, and to
wash; forms those habits of cleanliness and order so necessary to a
comfortable home; and becomes in every respect a thorough house-
wife. She gains also in self-reliance. Association with good white
people is the best civilizing agency that can be devised. Through it
the Indian youth unconsciously imbibe the traits of character of those
with whom they associate, and continue to become more like them the
longer they remain in their society. From this intercourse and associ-
ation, and from the fact that each is thrown upon himself to main-
tain his standing among his white acquaintances, comes a stamina
and strength of character which is so important to future success. It
gives a confidence in one's ability to overcome circumstances and
shape them to one's needs.

To put a pupil in a family where he is regarded as one of the house-
hold is almost the ideal way of educating and training him to civilized
living. He is put in the exact position of the white boy of his own
age, and is acted upon by precisely the same influences. The every-
day life of the family which he lives becomes gradually and uncon-
sciously a part of his nature.

As an Indian child adopted at an early age into a good white family
will grow up as much civilized as any of his white playmates, so a
lengthy outing has to a degree a similar effect, for the principle is
the same.

The plan of saving part of the earnings is one of the best features
of the outing system. The teaching of a proper appreciation of the
value of money is one of the ends aimed at in Indian education, and
by the boy or girl putting aside each month a part of the earnings of
his or her own labor, this much-desired result is secured to a very
gratifying degree. To earn money by one's own exertions is to appre-
ciate its value a hundredfold more than to obtain it without effort.
From this will follow also a proper appreciation of the value of time
and labor. The pupil will be required to keep a record of his deposits, withdrawals, and expenditures, and this will teach him a knowledge of accounts, the observance of system, and the practice of economy and thrift.

After having lived under the outing system a few years the pupil will have accumulated a comfortable sum, the possession of which will stimulate an ambition to possess a home and will be of immense assistance in providing it—the boy’s savings to build the home and fit out the farm and the girl’s to furnish the house. The keynote of Indian education is self-support, and this is the best way to lay the foundation.

The homes for the placing of students should be very carefully selected by the agent or superintendent, and should be those where the conditions are most favorable for the attainment of the objects aimed at. The pupil must be permitted, and in fact made, to attend the public school while it is in session, must be treated as one of the household, and must be allowed a certain monthly sum for his services.

The pupil will be allowed to spend a portion of his earnings for clothing and incidentals, and the rest will be placed on deposit in accordance with arrangements made by the superintendent.

The person with whom any child is placed should be required to make a report periodically upon the progress and efficiency of the pupil, and a record of all these reports will be kept at the school and incorporated into the annual report.

As said before, the most favorable time for placing the children out in these homes is during the spring and summer months, but a considerable portion of them should be out at all times of the year.

There are some localities, of course, where the conditions are such as to make it impracticable to carry out this system extensively, but an effort should be made to place a few children out in the best families near each school.

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PAINTING.

It is desired that some knowledge of painting be possessed by all Indian boys. They will need it frequently on their farms and in their homes. The proper and timely use of paint will aid in preserving their farm implements from rust, their wagons from the effects of sun and water, and their buildings from decay, and will give to everything a neat business-like appearance, gratifying and stimulating to the owner.

FIRST YEAR.

The first thing to teach the boy just coming into the shop is the importance of cleanliness and order, which beget economy, and therefore the first tasks which will be given him will be those of cleaning and straightening up the shop and putting everything in an orderly condition.

In addition to this, give him at first only plain, simple work, such as cleaning, sandpapering, and putting wagons, furniture, and other articles being prepared for painting; making putty, filling holes, scraping and washing walls to make them ready for the application of the paint, and work of a like nature.

Put him next on priming coats, and with this teach him the proper manner of holding the different brushes, showing him how to use his wrist instead of his fingers. Show him also how to wield his brush so as to apply the paint smoothly and uniformly, always giving the paint ample time to dry after the first, second, and third coats, and have him learn how to properly care for his brushes so as to keep them soft and pliable. He may now do regular painting on the outside of buildings, such as putting on the several coats on weatherboarding, etc., and in connection with this work will come practice in the putting up and working of a swinging ladder or scaffold used in painting the sides of a building, always being careful to test the strength of the scaffolding before using, in order to avoid accident. If he does this work well, a little more difficult work should be given him, as plain trimming on the corners of houses, etc. Follow this with practice in tracing sash, and then in the painting of doors. Show the student where he should begin in painting a door, and the order in which he should paint the different parts. Give practice also in roof painting, both with shingle and other styles of roof.
As soon as the pupils are allowed to use the brush, all the painting about the institution in any department that they are capable of doing should be given to them to do, in order that they may have the benefit of the practice.

Next, give plain frosting of glass, preparing walls for painting, painting walls in oil color and stippling, and flat color and stippling, painting blinds, and brick penciling.

The only work in wagon painting to be given this year will be cleaning, sand papering, and otherwise preparing wagons and carriages for the paint.

Never use any "size" on plastered walls; apply the paint direct.

Have the pupils learn the names of all their tools, and the proper way of keeping them when not in use.

Take up the mixing of paints. Give the pupils talks on the proper kinds of paint to use for different purposes, as, for example, that used for houses and that for farm implements and wagons; also on the best colors to use for various purposes. The instructor in painting will be able to think of many other points and topics as subjects for talks to the students. Show how the several coats of paint need different preparation. Have the boys apply the paint they prepare, that they may see the effect of the different methods of preparing. Give practice in this way in the painting of wagons, implements, and the interior and exterior of buildings, doing the plain parts of such work first and the best work last.
In wagon painting, make the pupil understand from the start the difference between wagon and carriage painting and house painting. The painting of farm implements and wagons at this time should be plain, no trimming or ornamenting being yet attempted. In wagon painting, teach the filling up and building of a foundation for color and the applying of the several coats.

Next, instruct in wall papering, wall painting, and calcimining. Show the students how to make their own paste, the proper applying of it to the paper, matching the paper, hanging it on the wall, and smoothing it out without wrinkles, applying paper to the ceiling, putting on border.

Similarly, show them how to prepare their calcimine and apply it, and likewise as to wall painting. Some lessons in simple frescoing should be given, if possible, and it is advisable to encourage each student to prepare original designs and cut the stencils. Give some instruction, also, in wall tinting and lining.

Where practicable, the instructor in painting should endeavor to have a few simple booths or rooms upon which the students can practice wall papering, calcimining, wall tinting, etc. But whenever work of this character is to be done about any of the school buildings it is especially important that the students do as much of it as possible, for this actual work is the very best kind of practice for them.

Give problems to the pupils in computing the cost of a particular piece of work, such, for example, as the cost of painting or papering a house of given dimensions and material in a stated manner. This will aid them in their work in mathematics, and will give them practical ability in undertaking and executing definite jobs. Give considerable work of this nature.

THIRD YEAR.

This year may begin with instruction and work in filling, staining, rubbing, polishing, and finishing of natural woods, benches, chairs, bookcases, wardrobes, tables, and other fixtures and furniture; cleaning and varnishing the woodwork of the buildings, school desks, etc.

In wagon painting, teach varnishing, rubbing, and finishing of painted work, striping and ornamenting of wagons and carriages.

Give trimming of houses and mixing and combination of colors. Endeavor to develop the boy's taste in the selection and harmonious combination of colors. Too much trimming and gaudiness, either in carriage painting or house painting, should be discouraged.

The more difficult and ornamental departments of painting will be taught this year. It is inadvisable to do so early in the course, for the reason that a student naturally dislikes to go back and practice on plain, rough work after he has had the more pleasing kind. The student should progress from the simple rough work (which is really
most important) up by gradual steps to the more complex and ornamental.

Some instruction in plain lettering may be given at this time. The proper order of teaching the various styles is, first, plain Egyptian; then antique, spurred, octagon, Roman, and fancy, in their order; but unless the boy wants to become a professional painter, only the plain Egyptian should be taught.

The instructor may find that this course can be completed in two years with some boys, and if so, it should be done. It is desired also that he give, in addition to what is here included, such other work as he thinks will be of value to the student, always keeping in mind that it should be of a practical, useful nature.

Those boys who have the ambition and the capacity to support themselves by painting will naturally need more careful and thorough training and probably a more lengthy course than those who learn it as an aid to them in some other occupation, as in farming. This must be left to the sound judgment and discretion of the instructor, who will be governed by the circumstances of each case.

Everybody's Paint Book, by Grinnell, and Painter's Encyclopaedia, by F. P. Gardner, and several other books on this subject will be found of great assistance.

Pupils should be required to read and study one or more standard works upon this subject, and an occasional examination may be given to determine whether they are mastering them.

Much valuable information upon this subject was furnished by Mr. J. F. La Crosse.
A teacher's first work should be to put her schoolroom in as nearly perfect hygienic condition as possible. The temperature and purity of the air should be the best possible under existing conditions. The windows should be kept open all day. Lowered a little from the top and raised from the bottom ever so little insures good ventilation. In winter while the fire is being kindled the air should be changed. Also at least once during each session doors and windows should be opened for ventilation if pupils are present; (every individual needs 98 cubic feet of air in each direction). Marching or some other exercise may then be engaged in. A child eats more and breathes more in proportion to bulk than the adult, and for this he must have fresh air in abundance. Fresh air is the great natural disinfectant, antiseptic, and purifier.

Children are comfortable in a well-aired room of 68° F. Our living rooms should be kept at about 70° F., since 70° and open windows are better than 68° and windows closed.

Air should be kept moist to be wholesome.

Another duty of the teacher is to see if the children have come to school with clean persons and clothing.

Whatever else is neglected, be sure to enforce cleanliness. If necessary, give the entire day to it, but it will soon be so agreeable to the children to be clean that there will even be rivalry about it and less time will need to be taken from the study. This accomplished, there should be simple conversational lessons about the parts of the body.

Begin with the head, top or crown, sides and back, face, and all features.

The hair, use and care, always keeping it well brushed. For destroying vermin use a mixture of equal parts of kerosene and olive oil (or lard), and teach the children that the person must be absolutely free from vermin. The boys should be compelled to keep their hair short. It will save time, trouble, and dirt.

The ears, their use, and how to keep them clean. The ear being extremely sensitive, no hard substance should be introduced.

The face and its features. The eyes, their use and care. Protect from direct sunlight, do not sew or read by the light of an open fire, and have the light fall over the left shoulder.

The nose and its use and care.
The mouth is for speaking and nose for breathing, and when through with the mouth, shut it up.

Care of the teeth, showing how they are covered with a hard substance called enamel and should not be picked with metal lest it break this enamel, nor should very hot or cold drinks be taken into the mouth lest they crack the enamel and cause the teeth to decay.

The clothes should always be kept well brushed and the shoes polished.

Eat for nourishment and avoid gluttony.

Teach that it is best to eat with clean hands and on a clean table. Show the Indian child that it is unhealthy to eat on the floor, where disease germs are numerous and are waiting to be carried with the food into the body.

Teach the great need of pure water. Show how the water supply may be contaminated by drainage from cemeteries, corrals, and other places that are sources of pollution.

How we breathe, why we need pure air. Have breathing exercises deep and full, with the mouth closed. The secretion of the nasal passages is germicidal. Teach that malaria enters the system when the mouth is used for breathing. The habit of mouth breathing should be corrected. Breathing through the nose prevents poisonous bacteria from entering the blood.

The skin and pores, cleanliness of person, bathing frequently.

Do not let the surface of the body become chilled, do not sit in a cool breeze when heated, never sit on the ground when it is damp, thus keeping away pneumonia.

Have exercises that train in the ready extension of the right hand or left foot, left hand and right foot, how to keep step in marching; also such exercises as tend to correct bad habits in walking or standing. Let all information be practical.

Show the pupils how the simple watchword “Chin in” will throw the whole body into better position. Another watchword, “Raise the chest,” is much to the same purpose.

Remember that the formation of correct habits is of more importance than information about the body.

The use of tobacco leads to diseases of the throat.

The use of cigarettes dwarfs the body.

The abuse of alcohol cripples the brain, stomach, muscles, and other parts of the body.

Teach in all grades avoidance of harmful thoughts, foods, and exercises.

In order to get the best out of life, it is necessary to look into the physical condition of pupils and give them the training that will counteract the influences of unfortunate heredity and strengthen the physique, in order that they may be able to bear the strain that competition in business and earning a living will impose.
Tuberculosis is not hereditary, and the child whose parents have had consumption must not feel that he will have it.

Too much attention can not be given to personal hygiene, comfortable clothing, ventilation, and to emergency cases, since a slight accident, neglected, sometimes develops into a serious matter and handicaps one through life. The child must be taught the value and use of his organs; the use of the bones; how to breathe; care of the body; how to sit, stand, etc.; care of the skin; care of the teeth; clothing in relation to dampness, draft, and season, and the influence of stimulants and narcotics upon the physical condition; emergency cases; cleansing and bandaging wounds; applying plasters; arteries, veins, and bleeding; burns, stings, and bites; poisoning; food and its relation to life; frostbite, hemorrhage, fainting, and convulsions.

The effect of alcohol upon the brain must be taught, how it hurries the blood through the veins, overworking the heart; also its influence upon the man generally, causing him to waste money and commit the most dreadful acts when under its influence.

Teach the importance of ten hours' sleep for children under 12 years of age.

Teach also consideration for others.

It is very important to show children how spinal curvature will result from sitting in a curved position, also how the sun influences men and plants, and that it is less exhausting to toil in the day than at night. Sunlight kills germs of disease and makes plants and animals grow.

Teach that tea and coffee may work injury to the development of the bones and muscles, strong coffee seriously injuring the nervous system. Alcohol in excessive doses causes the muscles to work out of proper order, as is seen in the uncertain action of intoxicated persons.

Muscles are increased in size and strength by exercise. The farmer's arm is muscular, but if he stops work for a long time the muscles weaken and grow small.

Exercise makes the heart beat faster, so that it forces the blood more rapidly through every part of the body. The blood on its way carries new food to each part of the body and carries away what has been worn out. The more we exercise, therefore, the sooner we get hungry, because the substances of which the body is composed are being rapidly changed and more material is demanded to make up for that which has done its work and is worn out and carried off.

The muscle which is often and vigorously exercised is hard and firm, because all its parts have been often changed, and all are young and strong.

This is why the healthfulness and vigor of the body depends much upon the amount of exercise we take.

Children naturally take what exercise they need, and this should be assisted by whatever system of school gymnastics the teacher is most familiar with.
The physical training which a child receives in school should help "proportionate growth."

It is well to interest the children in the matter of their growth. At the beginning of the school year let them take each other's height by standing against the wall or blackboard and have the child measure the distance with a ruler, and make a record of it with date when taken. In six months repeat, and again in six months. Let the teacher keep these, and at the end of the year he will have a valuable array of statistics.

VENTILATION.

The question of ventilation is the most important one the housekeeper has to face.

The temperature of a house should never exceed 70° F., and a room filled with pure air, having a lower temperature, seems warmer than one having a much higher temperature filled with foul air.

Hot air from the furnace supplies fresh air to the house, but steam-heated houses lack this supply and require some opening to admit pure air.

A board 4 inches wide, as long as the window is broad, placed under the lower sash, will give access to fresh air, does not cause a draft, and may be safely used in dormitories.

In sick rooms, or where very delicate children sleep, a good screen which keeps out dampness, admitting fresh air, may be made by using a mosquito net or screen frame covered with unbleached factory cloth. Raise the sash and place this in the opening at night.

The most fertile cause of contamination in schools is the breathing of children in rooms inadequately supplied with air. "The breathing process involves the using up of oxygen and the giving off of carbon dioxide, and small quantities of organic matter, which is undergoing decomposition, reduce the quantity of oxygen below a certain limit, and the air becomes unfit for breathing purposes and evil effects follow."

In dormitories that are poorly ventilated and on playgrounds where many children meet, the bad effects result from the decomposing organic matters given off from the lungs, which act as poisons, having been thrown off from the lungs because they are unfit for use. Taken back into the body again, they interfere with normal processes.

Air becomes contaminated by decomposition of animal and vegetable matter, causing many diseases. Whether a room is warm or cold, it is safe to have a window open at the top and at the bottom a little, for the escape of the heated air and the gas.

In all dormitories and sleeping rooms the windows should be opened at the top and bottom, not exposing anyone to a draft.

The entire house should have a thorough airing every morning.
As soon as the dormitories are vacated, open all windows and throw back the coverings so that they will get the benefit of the current of air.

Once a week all mattresses should be thrown across the foot of the bed, so that the air may circulate all around them.

After sleeping apartments have been put in order for the day, windows and transoms should be left wide open until an hour before they are to be occupied at night, when they can be arranged as suggested above.

Superintendents should ask for blankets instead of comforts for use in the school, and children must be required to sleep between sheets, and both boys and girls should have suitable night robes. Canton flannel is good for winter night garments.

Teachers are not liable to have headache who see that the windows of their schoolrooms are lowered from the top and raised at the bottom and the whole room ventilated more thoroughly twice a day and after the children leave; and much better work will be done by the pupils if between recitations the windows and doors are opened and the children are given a breathing exercise in expanding the lungs—a brisk, brief exercise in marching with chest out and heads up, and a short calisthenic exercise involving the use of arms and legs.

It must be remembered that a great volume of pure air sweeping through the house for ten minutes will more effectually remove impure air than airing for hours with windows only partly opened and closed doors.

**SUMMARY.**

Ventilate all rooms by having windows raised at the bottom and lowered from the top a little. Windows in all rooms should be opened on the sunny side whenever the sun shines. Special attention should be given to having enough windows open in dormitories, schoolrooms, dining rooms, and assembly halls to insure good ventilation.

Curtains should never be placed at the top of any window in any room in any school, but at least six inches below, and windows kept open at the top and the air given free access.

In all rooms heated by stoves, a pan of water should be kept on the stove.

Dormitories should be warmed for children to undress and retire, but not kept warm through the night.

Single beds should be used in dormitories, one child only in a bed. Buckets or boxes used in dormitories at night should have lids and be put into the rooms the last thing at night, taken out the first thing in the morning, and aired outside all day.

Each child must have his own comb and brush, towel, toothbrush, and two children must never bathe in the same water. Chloride of lime should be freely used in all lavatories and closets as disinfectant. Matrons can not be too careful in looking after this matter.
NURSING.

The children should be taught a few general rules for the treatment of sore eyes, fever, and emergency cases.

Sore eyes being prevalent in the schools, is the first malady to which the attention of the pupils should be directed. When inflamed, teach always to bathe in hot water. Boric acid, one-half level teaspoonful to the pint, added is good. Apply to the eyes and bandage. Caution against rubbing the eyes. Isolate the sore-eye patients. Guard against infection. It may be necessary to keep in a darkened room or have a shade put over the eyes as a last resource.

Fever. — When a child is feverish, give plenty of cold water; bathe the face, arms, and hands frequently. Give ice and lemons and send for the school physician. Keep the patient in a cool, quiet place and in a recumbent position. Every school should have a clinical thermometer and older pupils be instructed in the use of it. Every student should learn to count the pulse and respiration.

Sorens. — In the treatment of sores the most important point is cleanliness. Wash frequently with sterilized water, and bandage. Have a good salve ready for use.

Burns. — Have a preparation of equal parts of linseed oil and lime water ready, and if the pupil should receive a deep burn, apply as quickly as possible. For a slight one, common soda, and a bandage to exclude the air, will give relief most speedily. Vaseline or fresh lard will do, and bandage as before.

Bandages. — Have plenty of bandages always at hand.

Cuts. — When a child receives a cut bandage as quickly as possible. If not clean wash, off with sterilized water, if possible, and bandage.
Use expedition in this. When bleeding profusely, bandage above and below the cut tightly, and call physician. Spirits turpentine (clear) applied to superficial cuts will stop bleeding.

The matron will be familiar with the school pharmacy and have a general idea of the use of simple drugs as prescribed by the school or agency physician. The older girls should be called upon for assistance in treating all cases, explaining the drugs, their respective healing properties, and the doses, to the end that they learn how to handle the same; but under no circumstances should a pupil administer a dose of medicine to a pupil. This is the duty of the employee in charge of the patient. Too great caution can not be used in administering medicines.

Pupils must be instructed in the care of the sick both night and day, which includes the light, heat, and ventilation of the sick room, the preparation and preservation of the nourishment for the patient and bedside notes—a record of the pulse, temperature, respiration, and general condition of the patient; the importance of keeping the sick room clean, well ventilated, an even temperature, and not permitting the patient to sit or lie in a draft; to let as much sunshine into the room as possible, and to keep the bed and the patient dressed with clean linen; to attend to the comfort of the patient, using a backrest, if needed; changing the bedding and clothing of the patient expeditiously and deftly, and moving and turning the patient in bed, giving him proper attention when coughing, vomiting, or when in great pain.

Never permit food to sit in the room. Milk absorbs odors very quickly. and odors are caused by actual particles of organic matter striking the nostrils.

Instruction in carefully bathing the patient, using massage where necessary, applying poultices, mustard plasters, and hot-water bags, etc., must be given.

Also in handling, measuring, and administering medicines. The danger of an overdose and the necessity for keeping everything carefully labeled and always looking at the label before pouring a dose. A nurse must learn to watch the position, color, skin, tongue, appetite, breathing, sleep, and cough of a patient, to administer enemas, use douches, and the greatest care is to be exercised in the disinfecting and disposal of discharges.

Teach that hot water is an excellent remedy for nausea; also one-half teaspoonful soda and eleven or twelve drops peppermint in hot water. That sulpho-naphthol is an inexpensive and excellent disinfectant and deodorizer. That ordinary wood ashes placed in buckets used in dormitories will disinfect. That there is great danger of contagion in diseases of the skin and eyes, and that two children should never bathe in the same water. That a small square of linen a little larger than the eye and having four strings is the most comfortable bandage to
make for the eye. That the normal temperature is $98\frac{1}{2}$°, respiration 18 to the minute, and the pulse 72 male and 75 female.

In conclusion, remember that while heated gases rise in a cold room, carbon dioxide does not rise. The room is not thoroughly ventilated that has windows open at only the top or only the bottom, but there must be openings above and below, for the air from all parts of the room to escape.

Teach that it is necessary to ventilate every room in the house. That in sickness or health there is nothing more necessary for the physical and mental condition than good slumber. That it is better to sleep without a pillow and never with the head covered.

Well-aired rooms, frequent bathing, clean clothing, pure water, and hygienic surroundings are the conditions that make for health and success.

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TUBERCULOSIS.

Tuberculosis is due to a living germ (something like a seed).

It is coughed up by people who have tuberculosis. When this gets dry it will float in the air, and so may be breathed in by any man, woman, or child. When this germ is breathed in by anyone whose health is not good, whose lungs have been made weak by sleeping with head under the bedclothes or by bad air from neglect day or night, so they can not resist disease, the germ will live and develop, and will produce more germs of its own kind right in the lungs.

This germ growth in the lungs causes the condition we call tuberculosis, or consumption.

Soil as well as seed is necessary for the development of a new growth.

There is little danger to a healthy person, even in the near presence of the germ, because the lungs of a healthy person do not offer the right conditions for the seed or germ to develop in.

Those who have lost parents or relatives from consumption can escape from it forever by careful attention to the laws of health. Cleanliness, fresh air, well-ventilated sleeping rooms, good food properly cooked, are of chief importance.

Sunshine will kill the germs of disease and make plants and children grow in health.
In order to escape taking tuberculosis, when it is our duty to live near one who is suffering with it, the following rules should be observed:

First. Keep what is coughed up from getting dry and so floating in the air.

Second. Observe strict cleanliness about the patient.

Third. All that is coughed up must, in order to prevent flies carrying it, be kept covered in a tin cup or glass jar partly filled with water (a sheet of paper may be used for a cover) or in a box of moist earth, ashes, or sawdust. Where a disinfectant can be obtained it must be kept in the cup or jar. In any case the whole mass must be buried in the earth, so that no particle can dry and be blown about. If the patient is too weak to use a cup he should use a cloth, which in all cases must be buried. Wet it in a disinfectant, so that it will not have a chance to dry. Never allow anyone to spit on a stove or on the floor.

Fourth. If a consumptive person must travel, he should have cloths or a large-necked bottle to spit into. This is the only safety for the public.

Fifth. After death, all infected articles, such as rugs, carpets, and bedding, should be washed and disinfected or else destroyed by fire.

Sixth. Care should be taken to keep flies away from all infectious matter, as they may carry it on their legs to food, which, being eaten, will carry the germs of disease into the stomach of the eater.

In order to do the best work for oneself or others the mind must care for the body.

Germs of disease float in the air we breathe, swim in the water we drink, and are in the ground under our feet. They are always ready to lodge and grow wherever they can find a weak spot in our body—that is, wherever there is a weak cell growth and so little power to resist. A colony of disease germs will develop very quickly in a weak spot, and they will infect an area about themselves until the whole system is sown with disease germs.

Sunshine, cleanliness, and good food not only protect from disease by increasing the resisting power of the body, but may also overcome and drive out disease already acquired.
PRINTING.

Not many of the Indian boys will follow printing as an occupation, but some may, and the training and experience will be of very great benefit to everyone, whether or not he ultimately uses the skill and knowledge gained as a means of livelihood. It trains the pupil in intelligent composition, the construction and punctuation of sentences, and the spelling of words; develops his powers of originality and invention; and strengthens his traits of self-reliance by the necessity under which it places him of selecting proper type and arranging it artistically in the various forms of printing, such as announcements, invitations, advertisements, etc.

It may be found that some of the boys have a desire and aptitude for this kind of work, and these should be encouraged to carry out their ambition and become skillful workers, and endeavor to obtain a place in some printing office in a neighboring town or elsewhere.

Before going into the shop the boy must have a fair knowledge of the English branches, particularly of grammar, reading, and spelling. At what age this will be is, of course, impossible to say, and the instructor must ascertain for himself in each particular case; but probably the average age will be about fifteen years.

On his coming into the shop for the first time certain injunctions will be given to the student and their observance enforced. Of these, the most important will be strict punctuality, neatness, and order. These are indispensable to good work and success in any business.

At first the pupil will be given some of the simpler work of the office, such as running a small job press. This will be agreeable work to him to begin with, and when he finds he can do it successfully it will help much to stimulate interest in his new work. Caution him to be very careful that he does not get his fingers or hand caught in the press and show him where he is most liable to get his hands into danger and how he may avoid it. When he has mastered the running of the small press, he may be advanced to a better class of work on a larger press, proceeding thus until he has become quite efficient in general presswork.

The presses should be carefully cleaned and oiled every morning before starting up and always kept in a neat condition. In order that the oil may always reach the bearings, all oil holes must be kept clean.
and open. Otherwise the bearings will become dry and wear out rapidly. A well-oiled, well-cleaned machine will do much better work than one receiving scant attention in these respects, and its life of usefulness may be almost indefinitely prolonged.

The care of the press and the type are subjects on which talks should be given, and the instructor in charge should see that his injunctions in these respects are carried out.

The next thing to teach him will be the positions of the letters in the case. An excellent method of learning the case is by means of a diagram showing the locations of each letter. This diagram should be made by the boy from a copy, and he should study it diligently for a few hours. After he has mastered it fairly well, put him at a case with large type, so that he can easily distinguish the letters. Then show him how to hold his stick in his left hand and pick up the letters with his right. Set up the first line for him and the next let him set up himself, watching him to see that he does it correctly. When the line is filled he must be shown how to justify it and make the spacing uniform. After he has set up a few lines correctly he may be allowed to proceed until his stick is well filled, when he should submit it for correction to his instructor, who will then show him how to lift the matter out of the stick and place it upon a galley. Of course, only plain, simple matter will be used for this practice. Be careful to caution the boy in regard to the setting of "tied" letters, i. e., letters such as ff, fi, fl, ffl, etc. The student will find in the case combination types to use in words where these letters occur, and he must always use them; otherwise the type will be crushed or thrown at an angle.

As soon as the beginner has learned the case so that he can locate unerringly and without hesitation the positions of the various letters, can read the type, and can distinguish the letters from each other, such as n from u, b from q, and d from p, he should be given his own distributing, being cautioned to drop the letters lightly into the boxes that the type may not be marred. But this must not be done too early, and not until the boy is able to set fairly well and is perfectly familiar with his case. Unless the distributing is done without errors clean typesetting is almost impossible, and hence the importance of uniform accuracy in this respect from the beginning. This work will occupy a considerable time before the student is fairly proficient in it. The important point is to start him rightly, for upon this will depend his future style and manner of working, and the instructor can not be too careful.

At the beginning care must be taken that the student acquires no bad habits, such as standing in an awkward position or upon one foot, or throwing or swinging the body or arms around unnecessarily while seeking for the letters. Rather let him stand erect, reaching for his
letters with an easy, natural, graceful movement that will conserve both time and energy. He must avoid all false movements such as making two or three attempts to pick up a letter, tapping it against the stick or other letters in placing it in position, or other nervous and unnecessary movements in the act of reaching for the type and placing it in the stick. Every movement should be direct and clean-cut.

Standing is the most healthful position for the compositor, as a general rule, and after he becomes accustomed to it will be found the most comfortable. In distributing, however, stools or benches may be used, as in this case they do not interfere with the rapidity of the work, and they afford a change often very restful to the operator.

Another thing to insist upon with the beginner is accuracy. Accuracy begets speed, and the learner who starts out by being inaccurate will never be a very valuable compositor. In distributing, also, if letters are carelessly put into the wrong box the liability of mistakes in setting up will be very much increased.

Considerable attention must be given to spacing and justifying, as both are quite important. Give talks to the students on these points. The instructor should occasionally run his finger along the side of matter which has been set up, and if he does not find it even, it must go back into the stick again and be justified properly.

Practice in locking forms will be given at the proper time. This work and that of the subsequent handling of the forms is one requiring much care, in order that the danger of the form being "pieed" may be reduced to a minimum. The matter being once carefully arranged, careful locking and careful handling of forms are the safeguards against "pieing." When inserting the quoins make them point toward the solid side of the chase; that is, the side on which no quoins are used. This is a point very often overlooked by learners.

At the job press, after the student has become familiar with its use and can do work rapidly and without errors, he should be given the work of placing the forms in position and adjusting the platen so that the impression will be smooth and even, neither too light nor too heavy. To adjust the platen for this purpose, instead of moving the screws regulating the base of the platen, he will use cardboard and paper under the platen to graduate it to the thickness of the paper being used. He must also be shown how to adjust the gauge pins in order to make the margins straight and of the desired width, and while running off the work a close watch must be kept upon the gauge pins to see that they do not get displaced. Next he will learn how to ink the rollers and how much ink is required to obtain the best results.

Proof-reading will receive careful attention. Ability in this respect is very important to every printing office and often determines its success or failure. Every printer should be a capable proof reader, and the instructor will see that the learner receives sufficient practice to
enable him to proof-read correctly any ordinary manuscript. This work will also be of great assistance to him in other branches of his study, particularly in English.

Much instruction must be given in the various kinds and sizes of paper. Let each boy be given frequently the work of estimating the cost of a stated job with a specified quality of paper. The instructor should give the students talks on the various sizes of paper out of which jobs can be cut to the best advantage. In many offices there is a great waste of paper on account of the lack of this knowledge and ability to select the most advantageous sizes for general work. It is well to instruct the students as to what sizes of paper are in common use. Talks should also be given on the quality of paper, illustrating by samples, to enable the boy to distinguish the various grades. Give work also in estimating the amount of paper required for certain jobs; then examine the results obtained to see if they are accurate. Requiring the students to attend to these matters and manage a job from beginning to end creates independence and self-reliance, and avoids the growth of habit of leaning on others.

Be careful to see that the students, or whoever is in charge, keeps the stock of paper in neat and proper order and keeps a careful account of the amount on hand.

The length of the course in printing and the work to be given to the boy as he progresses is left to the sound discretion of the instructor in charge of the printing office. It is not deemed wise or practicable to lay down arbitrary directions as to the work to be followed each year, as the character of the work done in a printing office is such that more real progress can be made by leaving the instructor free to utilize the work to be done in the manner he thinks most profitable to the student. The boy will thus learn the work in the same manner that he would if he were put into a regular newspaper or printing office. Hence the directions here given are largely in the nature of suggestions and advice as to how to start the pupil when he enters the office, for it is believed that if he makes a proper beginning success in his subsequent work will be sure to follow.

As an aid to the instructor and showing what is expected to be given to the student during his course, the following suggestions are given:

Give instruction and practice in all the details of presswork, including making ready and running small jobs on job press; learning the cases, sizes, and faces of type; setting type; justifying, spacing, and emptying stick; leading; arranging in chase; locking up forms; correcting proof; cleaning and care of type; distributing dead matter; care of press; and folding, wrapping, and mailing newspapers and pamphlets.

Take special care to instruct the students so that they will become clean compositors, both in typesetting and distributing.
Capitalization, punctuation, and the correct spelling and use of words will be taught as needed in actual practice.

Correct judgment and taste in setting up advertisements and jobs, and a general knowledge of newspaper, book, and job work; printing of blanks, letter-heads, envelopes, programmes, posters, bills of fare, and reports; presswork; the simpler forms of bookbinding; and other features of the trade will also be carefully taught.

If a paper is issued from the office, this will also be the subject of practice and instruction, which will be of the utmost value to the student as a future printer.

As heretofore said, those who show special aptitude for the work and desire to pursue it as an occupation should be encouraged to attend a school where they may receive more elaborate instruction and practice, or to enter some printing office as a helper.
READING, LANGUAGE, AND SUBPRIMARY WORK.

The teacher of Indian children must have a general understanding and thorough sympathy with the peculiar circumstances of Indian life, using the articles of the Hampton creed and making her school a school of labor, of love, of life; bearing in mind that we are educating the children for right living and that lessons in kindliness and truth are most important. She must show them why it is best to do right, and, by studying their environment, prepare them for what will, in all probability, be their surroundings after leaving school. As a noted educator wisely says, "There are mighty possibilities to be developed in these little children's souls, and it is developing judgment, skill, inventiveness, generosity, self-respect, self-reliance, love, and the power to build homes that we must think of when we plan for the educational machinery."

Every day a brief space must be devoted to lessons in physiology, impressing the need for cleanliness of person and surroundings, masticating the food well, and giving exercises in expanding the lungs. The teacher must see that there is plenty of fresh air in the room at all times, at least two windows being open and one open at both top and bottom. The greatest attention must be paid to the child's physical well-being. The ventilation of the schoolroom is a most important question. The good health of pupils, as well as teacher, depends largely upon the air taken into the lungs. Avoid drafts, and be sure that pupils are comfortably clothed, never permitting them to sit in the room with wet feet.

In every class room the teacher will have written on the board, in a prominent place, the day of the week, the month, and the year, and will call the attention of the children to it sometime early in the day.

The housekeeping duties in the class room must not be neglected. The desks and chairs are to be dusted, the plants watered, the pets fed, the wood boxes well filled, if fuel has to be supplied, and each taking turns in sweeping the room after school, and all helping to keep it in general good order.

All national holidays and the birthdays of prominent men and women must be appropriately celebrated.
SUGGESTIONS.

"Special attention should be given to language, articulation, enunciation, and purity of English of pupils in every grade. As soon as a pupil falls behind his grade, because of imperfect English, he should receive special drill. If this be rightly done in the lower grades, the higher grades can do their legitimate work without loss of time on special language drills. No pupil's needs, however, should be overlooked.

"Every teacher should study the various pamphlets issued by the Department and be conversant with their requirements. He should be acquainted with the contents of the library and other collections, text-books, and the grade to which they are assigned. All teachers' books and aids furnished by the Department should be familiar to him. A growing professional library of one's own will do much from year to year toward making a teacher an artist in his calling."

FIRST YEAR.

A careful study of the surroundings of the child and a knowledge of his home life will enable the teacher to plan work that will prepare him for the life to which he must return after school days end. The idea of the kindergarten in the Indian school should be the same as that in the Berlin school, viz, "to make everything plastic to the nature and needs of the child." It is well known that children show greater preference for animate than for inanimate objects, and it is an excellent plan to have birds, fish, and animals, wherever possible, in the class room for the entertainment and instruction of the little ones. Give the little child only what he can experience and comprehend. Descriptions of animals he has not seen are of little value compared with a discussion of those he knows. "It is the drama of life as it comes in the experience of the child that commands the interest and attention of unfolding minds."

The work this year is not "to secure devices for making history, geography, reading, etc., interesting, but to bring out steadiness, precision, and thoroughness, which book learning rarely imparts, and on which excellence depends," as one of our schools so well expresses it.

An Anglo-American child upon entering school for the first time brings with him a vocabulary containing a large proportion of the words used from the first to the sixth grades. An Indian child comes with practically no vocabulary. Manifestly the first need is to teach the child to talk. To acquire this art he must begin at some mother teacher's knee. For this work with Indian children the natural method is the only feasible one. The mother in the home has shown us that the natural method begins with objects; that it is not more necessary for

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the child to catch hold of a chair or his mother’s dress in order to lift himself from the floor than it is that he have objects for his mental climbing. We therefore try to make the first year as nearly like a home as possible by having a large family of dolls to take care of. Their clothes, sheets, pillowcases, blankets, bedspreads, napkins, and tablecloths are to be made, and the dolls and their house demand regular and daily care.

The house for the dolls is to be built. A large box may be used at first, with partitions put in for rooms, the walls papered, and the house furnished. The first thought will be the preparation for the night. Beds must be made for the dolls, with mattresses, pillows, sheets, and covering. The mattresses can be made of cheese cloth filled with grass which has been cut and dried. Small beds may be made of thin wood, such as many boxes are made of. Heavy comforts will be made for cold weather and spreads crocheted or knitted. The other furniture needed for the comfort of the doll’s house can also be made from time to time, one piece at a time as it is needed, and as the little fingers gain skill in handling tools and materials.

Blocks, both large and small, will go far in furnishing the house and helping construct furniture easily; for example, nailing a thin piece of wood to a cube for a chair, or on top of a cube for a table, or making a bed with six large blocks, etc. (see illustration). Furniture may also be easily made of grasses and twigs found in the locality, seats and backs being woven as per illustrations for first steps in basketry, and the legs tacked on. If stiff twigs are not to be had, wire may be used for the foundation and soft grasses, straw, etc., for the weaver.
The daily care of the dolls embraces taking them up, bathing, and dressing them every morning and preparing their meals, airing the beds and making them up for the day, turning the mattresses, putting on sheets smoothly, and having nice netted or crocheted counterpanes. The rooms must be made comfortable with carpets, which may be made of scraps of cotton or woolen cloth prepared in balls as for carpet rags. (Rope, grasses, etc., may also be used.) These should be braided and sewed together or used as the woof of a carpet that may be woven on a home-made loom. Or the scraps may be knitted or crocheted on large wooden needles (made by the children) into a very nice covering for the floor. The dolls require clothing, and this will be made by the little children. When they are ill the pupils must be their nurses, bandaging broken limbs and wounds. "The daily round" in the household furnishes interesting occupation. On Monday the clothes are to be washed, rinsed, and hung on lines to dry, the children using small tubs and washboards, and in bad weather stringing the lines across the windows. On Tuesday the clothes are sprinkled and ironed and aired. On Wednesday they are mended. Let the children have small washtubs (or pans, if tubs can not be had). Make washboards for each. Provide tiny cakes of soap and have small irons that these small housekeepers may not lack implements.

Sewing is one of the earliest industries given the child. Basting stitches are given first, then the running stitch, which is the one used at first in doing the necessary sewing. Patterns for all work are cut out of paper from patterns drawn on the board and prepared for the use of the pupils by the teacher before coming to class. Thus the work spirit is cultivated along with the play spirit, and the children will, in the happiest way, absorb lessons in English and learn to say many words unconsciously.

The teacher must plan ahead for the meals that are to be prepared for the dolls. Cereals and beverages must be prepared in the correct way. Tiny potatoes or vegetables of other kinds may be selected and pared and prepared for the doll's table, cooking them in different ways, as one does in a well-regulated family. Small pieces of steak
may be cooked, varying the menu with different meats, or the same kind prepared differently. Small pans of biscuits and loaves of bread will be made and baked. The table should be set to present a pleasing appearance. The tablecloths and napkins will be made by the children and kept well laundered. The dishes may be made out of clay or cardboard. Colonel Parker's school has a small kiln where dishes made by the children are baked and a substantial glaze put on and really useful articles thus made. All pans must be kept bright, and tiny cakes of soap and small tea towels kept in their proper place to use as needed. The house must be swept, dusted, and kept clean every day.

![Domestic work in the kindergarten.](image)

Crochet instead of weaving needles are used to do practical work, such as making curtains, hammocks, bedspreads, carpets, etc., that will help to furnish the doll's house and make the child resourceful. The teacher will have in mind the practical application the child should make in utilizing everything available for the comfort and adornment of the home.

Mats and baskets may be made of willow or grasses for use in the household as well as for presents at Christmas time.

The fall thought—preparation for the winter—gives much interesting employment. Cocoons must be gathered and kept carefully to impress the resting season of nature—winter—and also with the
Easter thought in view, the awakening of nature in spring. Plants must be brought in from the yard and fixed in the windows for the winter. They must be cared for every day. Seeds are to be planted in boxes (made by the children with the help of the teacher) to beautify the windows during the winter and assist in teaching many lessons in nature and in language, as also to cultivate the aesthetic side of the child, which is highly important. Seeds are to be gathered and put into envelopes and labeled, to be ready to use for next year's planting. Nuts, also, must be gathered for the children and the squirrels kept in cages in the classroom, and fruits dried and preserved and pickled for use in winter; all showing how nature provides through three seasons sufficient food to sustain her children during the one season when she rests. Judgment should be exercised in putting by the stores she so generously offers. Give practical illustrations of the different ways these things may be preserved. Pupils must can corn, can tomatoes, dry corn, peas, fruits, berries, and peppers, and make pickles and preserves.

It will be interesting to have a large box of earth in the classroom to represent the farm and teach the work that must be successfully conducted outside of the house. During the winter, in talks with the children, plan the crops to be planted and the fruit to be raised. Let everything cultivated be that which is suited to the climate and conditions of the environments of the children. On this miniature farm the fields must be divided by fences, the barn and other outbuildings located and built by the children of blocks or thin wood, and walks laid from building to building. Farm stock and fowl may be cut out of paper and placed where they belong. Through song and talks the children will live the life of the farmer. The soil must be prepared for the crops, the fields plowed, harrowed, and planted with real seed, such as will come up quickly. Talks will be given daily on the influence of the sun and rain, the farm animals, their habits, food, and usefulness; how plants and animals are interdependent; on bees and bugs, ants, etc., and how they help and hinder man and plants. Talk to the children also on trees, the planting of an orchard; on flowers, their colors, perfumes, and uses—to fertilize the plant, to furnish food to the bees, to beautify the landscape, etc.; on the water supply on this miniature farm and the need for keeping it clean. Show how the town needs the farmer, and the interchange between farm and city. The interdependence of the occupations of the world is a valuable lesson to present.

Potatoes may be planted in the window boxes. They grow easily, and useful lessons may be impressed before the season comes for them to be planted in the gardens. Early in the spring cabbage and tomato plants must be raised in the classroom to be transplanted in the garden to be made out doors. The cotton plant may also be raised
in the windows. Attention must be given to clay modeling, making the fruit and vegetables the children deal with, and other things possible to be made in clay. Drawings of the toys, dolls, tools, and other objects dealt with will be made daily and colored with pencils, crayons, or paints. The love of parents for children, represented by pupils and their dolls, as evidenced in spending so much care and thought and time for their comfort and pleasure, leads to the thought of the Father's love for all.

Give talks on the animals and what they do for us, giving us food and clothing, and the care we should give them. The shepherd's care for his sheep leads up to the Christmas thought. Presents must be prepared for loved ones, and they must be strong and useful as well as pretty. In this, as in all other lessons taught, the utilitarian idea must be emphasized.

When the weather becomes pleasant and the children can work out of doors, have them build a house, the plan of which has been drawn to measurements in the schoolroom. They must lay off the ground, getting stones, if possible, or using brick for the foundation. Construct a mortar box and make mortar, fitting the stones accurately and making the foundation strong. The boards for the house will be measured as needed in building the structure, sawed into proper lengths, and the necessary joints cut and fitted. When shingled and otherwise finished, it should be painted, papered, and furnished. This work is most admirably done in Dr. Dewey's subprimary or kindergarten school.

The sand table, with its dishes, houses, and its possibilities for teaching valuable lessons in geography, etc., has a place in each day's programme.

A few simple songs illustrating the lesson may be given. Patriotic songs should be taught thoroughly. The birthdays of noted men and women and the national holidays give abundant opportunity to impress these.

There are many fascinating ball games that may be played in the schoolroom, using soft balls which the children can make themselves under the direction of the teacher, using scraps and rags for filling and covering with a piece of durable cloth. No game affords greater amusement nor is more restful after a long sitting than a ball game conducted by the teacher. A few moments each day should be given to stretching and yawning. Bean bag is another good game. There are many sense games that are helpful. Jumping, hopping, marching, running, and skipping should be indulged in frequently. Skipping to music, changing the time and the step, is excellent exercise. In all this work the child will unconsciously learn to speak English. The teacher will be careful to emphasize important words that are in daily use, sometimes writing the word on the board, the children being permitted, if they wish, to "try it" themselves. Such words as face, hands,
fet, boy, girl, dress, coat, play, eat, talk, laugh, and many others should be of such frequent recurrence that a vocabulary of over 50 words in everyday use will soon be acquired. The teacher should keep a list of the words comprising the vocabulary of the children. This will be approximate, since some brighter children will easily learn more words than others, but the vocabulary of the average child will give the words that may be used as a foundation for the simple reading lessons and the first lessons in writing that will follow.

The occupations of card sewing, parquetry, mat weaving, etc., have been eliminated from the best schools, and the more practical work of the home is given the child. The children must be encouraged to talk, helping them to say the words when their interest is especially aroused, having all say the same word, inventing games of “saying words” by drawing the picture of the word, writing the word with chalk, and leading the children unconsciously into conversation. Stories must be told daily and the pupils given the freedom of a home, at the same time expecting each one to perform his allotted task.

In the winter carpenter plays will form an interesting diversion. Many houses will be built of blocks and one made of logs or boards and shingled. Houses will be built for the birds to nest in. There will be made, also, boxes for the windows for plants, small coops for the young chicks and the hen mother, sticks and small ladders for the garden, little washboards, butter paddles, knitting and crochet needles, and many other useful articles needed in the class room, not to forget the furniture which will be made for the doll house. Visits to the stables and talks about the cows will lead up to lessons in the care of milk and butter. With a few utensils the milk and cream can be cared for. The teacher will have a churn in the class room and let the children make butter frequently during the year. After churning, each child must be given a tiny bit of butter, which he will work with his small paddle, adding salt and putting by the small rolls or prints for the doll’s table.

Little shoes, cut out by the children from patterns prepared beforehand by the teacher, may be made of flannel cloth or some soft material at first, and later of soft leather.

Each child must make a scrapbook. The leaves may be made of cotton cloth. Encourage the children to collect and save pictures, each trying to secure the best ones possible; but it is interesting to allow the child to make his own selections, pasting in his book pictures that he admires and arranging them according to his own notion.

Making bird houses will suggest talks on the birds, their habits, how they help the farmer, and the protection we should give them. The care of the fowls will be further interesting occupation. Collecting the eggs, marking them, and “setting” the hens, watching for the little chicks to break the shell, then caring for them. Having ready
small coops, securely made and nicely painted, for their homes, feeding them regularly, letting them forage pleasant days, putting them to bed each evening and letting them out each morning when the weather is favorable, seeing that their roosts and houses are kept clean and whitewashed every year.

In spring the gardens are the farms on which each child will raise as many vegetables as possible. The drawings and plans for these gardens will be found in the first year in gardening, which the classroom teacher will readily understand and be easily able to carry out. Beautiful gardens planted under the instruction of ladies—teachers from Cornell and other leading colleges in the country—attest the skill gained in this work by interested women. Miss Jackson, of Mr. John R. Kirk's school, Kirksville, Mo., has a class of normal students who form a very bright example of the practicability and success of this idea.

Lessons in geography and number will be learned in the school yard, studying the lay of the land, measuring off and making the gardens, watching the awakening of nature, transplanting such vegetables and flowers as can best be moved from the schoolroom windows to the gardens, planting seeds, watering the beds, and watching the young plants grow and mature.

In sewing, have the children assume correct positions of the body, use of the needle, etc. Children must be made to feel individual responsibility. They must take pride in the appearance of the class room, each one picking up carefully every scrap he has put down and keeping the floor under his desk well brushed. Each child shall dust his own chair or bench. When windows are to be washed each will do his share as in the home. The neat appearance of the room may be maintained at all times when each is responsible for his own immediate surroundings.

It is a false education that permits children to leave their beds unmade, or the boxes, desks, or any place where they keep their belongings, in disorder. Throwing scraps on the floor or scraping mud from their boots, with no thought for the appearance of the place, or with the idea in mind that some one will clean up, must not be permitted. Each room should have a waste-paper box or basket, which can be easily constructed of pasteboard or woven of grasses or twigs by the teacher, and the children must be taught to use it. Individual responsibility must be insisted upon, and while the kindergarten or first year is like a home it should be a neat one.

By community work, by stories, pictures, conversations, songs, games, and other recreations the children will have gained considerable knowledge of the language. They should have the faculty of observation well aroused, and should be able to compare forms, tell their size (large or small), color, and, to some extent, number.
First year pupils gardening.
It will be a good plan for each teacher at the close of the school year to leave with the superintendent a list of the names of the pupils who have been under her care and an outline of the work given and the advancement made by each child. This will aid the new teacher should changes in the personnel of the school force occur, as often do) to take up the work intelligently, hastily reviewing the work of the year previous, and advancing the child more rapidly and systematically. The sentences expressed by the little child should be written on the board from time to time, and, if the child wishes he may endeavor to write the words himself. This will be an interesting game to resort to occasionally.

The true mother-teacher will strive to secure before all other things the happiness of the children, for the sunshine of the schoolroom is to

them what sunshine is to young plants. She will keep in mind the fact that "education begins, continues, and ends in feeling." (These are the words of a prominent educator.) She will throw herself into the lives of the children, their thoughts, and games.

Conversation is the "soul of all exercises," from the kindergarten up, and the children should be encouraged by every device which the teacher can command. She should strive that some little advance be made each day in sentence work, being as systematic as possible in the selection of words. She should give the same word over many times and in a variety of sentences, representing experiences in the child's life, always taking care that the sentences have the simplicity of childhood.

Much of the time this year is spent in getting images, the life and environment of the school being entirely different from anything in his experience.
The children should be encouraged to make individual collections of stones, flowers, shells, etc., keeping them in boxes labeled in their own desks.

The work of adult pupils in this grade will be based upon their experiences on the school grounds, in the shops, on the farm, etc. This must be worked out for them, first upon the board, and later by chart made by the teacher, limited to the needs of the pupil. Great pains must be taken to give him the power to converse correctly in English. Any books used should be adapted to the age of the pupil. The pupil's needs will be the teacher's guide in planning and selecting lessons.¹

SECOND YEAR.

The child comes to the class room with no knowledge of reading, and such subjects must be so presented to him as to stimulate thought, making him observe the characteristics of objects, and enable him to express what he sees with chalk on the board and with pencil at his desk. This drill must be so thorough that after six months' work with materials, carefully studying pictures, and daily writing his impressions received from contact with them he will be able to take up the book and read any lesson embracing words with which he is familiar. The teacher will bring a picture or object before the pupils, judiciously questioning the class as to its appearance, qualities, use, peculiarities, etc., the children giving the description in short sentences, which will be written on the board by the teacher. They will thus get a mental picture of the sentence, or "story" as it may be called, as a whole. Let the children try to say the same thing with the chalk, trying a number of times. The teacher's hand may occasionally guide the hand of the child over the difficult parts. This will be tried at the board and at the seats on paper. The next lesson will bring out different descriptions of the subject under consideration, and another story will be written on the board by the teacher, which will be immediately erased, and be reproduced as accurately as possible by the pupils. If the child got a correct mental picture of the writing, he will reproduce it correctly; if not, the teacher will write it again and immediately erase it, and repeat until the child is able to write it correctly.

After some practice the child will be able to express the thought easily in writing. It will depend upon the teacher to make this drill interesting and continuous, and the child will gradually be able to add a few words to those he has acquired. Test his ability to grasp the subject under discussion by writing a number of sentences on the board, leaving blank places for the pupil to insert the right word, thus: "The squirrel I see has——feet. He has a——and——eyes. His coat is made of——. He has a bushy——. The——has four——." Thus the lesson is developed from the object and thoroughly comprehended by the child. After a while the child

¹ Course of Study Carlisle Industrial School.
will be able to write compositions. The teacher will put the object before the child. For example, the squirrel in his cage. Write the words *squirrel, tail, nose, fur, feet* on the board. Tell the children to write a story about the squirrel, using the words on the board and any others that may be necessary to tell a good story. These lessons may be read in the class by the pupils.

The teacher must arouse interest by sympathetic conversations upon subjects of interest to the child and make free use of pictures, which the child can describe orally. One child may point to an object in the picture and another tell what it is, to keep up the interest of the class. Talk about the life of the child’s home and the work he sees conducted there, the games and other amusements, and the daily occupations. Encourage the child to relate the folk stories, myths, and legends he has been told at home, and by judicious questioning encourage him to talk. Discuss what goes on at school every day. Name objects in the school and other rooms, of what they are made, and how. In conducting such a lesson the teacher must use the same words a great many times and in different sentences, writing short ones occasionally on the board, erasing them, and letting the children reproduce them as correctly as possible.

Select a reading lesson in the book upon some subject familiar to the pupils, and in story and by directing the conversation of the children make them use the words occurring in the lesson, even the very book phrases. Write each phrase or sentence on the board as given by the child; erase, and let the pupil rewrite. The reading book must not be put into the hands of the pupils during the days when this drill is going on, although care must be taken that the children use the exact sentences of the book. The words may also be put into new relations; the greater number of changes in the arrangement of the words the better. Vary the lesson by writing the sentence on the board, erasing the name of the object, and in its place draw an outline of the object. When drawn with colored crayons, this effect is very pleasing to the little ones. Have real objects, where possible, brought into the schoolroom; for example, if the subject of the lesson is a ball, the lesson may be introduced by a game of ball; the children using the soft balls they have made of cloth, as described in the work of the previous year. Let them toss and catch to the count. (This game is beautifully played in the kindergarten at Pratt Institute.) Have the children mold balls of many sizes from clay, coloring them with chalk by way of variety. A tableau showing the picture in the book may be arranged—Manuella standing with her hand raised as in the act of throwing it; Juan holds up his hand to catch the ball. Thus the children have acquired the meaning of every part of the lesson. After the game, questioning the children as to what they did will very likely produce the following answers: “Helen threw a ball;” “James took two balls, tossed one to Martha and one
to Henry;" "Fred caught a red ball." As these sentences are given, write them on the board, erase them, and let the child reproduce them. After all this drill, when the teacher asks "What is this?" holding up a ball, the child answers "It is a ball." He may not say exactly this at first, but sooner or later he will say it, and at once the teacher writes the sentence on the board. It is read as a sentence (called a story). With pointer or chalk the teacher individualizes the words. Each object in the lesson has been actually made by the child, as "big ball," "little ball," while the action words of the book, find, put, take, toss, catch, and the words "from" and "in" have been acted and written as well as talked about until their meaning and use are a part of the child's consciousness, and he knows all the sentences and all the words in the lesson. Now give the book to the child; show him the picture, question him concerning it. If there are script sentences, have him read them, then the printed ones. If the drill was thorough before the book was taken up, the child would readily read the lesson.

The next lesson selected will present new words in connection with the old ones. Each reading lesson should lead to the next. From a lesson on the ball, we might next select one about the apple. Have the children mold an apple from clay, color it green or red, and insert the stem. The clay balls may be colored with crayon to represent those in the book. The objects may be drawn on the board and the name of their colors written within or above them. While working, conversation will make the words familiar. The new words are apple, red, green, stem. Encourage the children to combine the new words with the old ones in many sentences. These must be written on the board, erased, and the child made to write them. Continue this work for a few days, then take the book, and have the child read the lesson. The transition from script to the printed sentence is easy. Children usually assimilate the sentences and can soon read the book lesson with little effort.

Oral work, such as is outlined here, should be the basis of the reading lesson throughout the year. Children like to see their own names in sentences, and the day work in the class room, introducing the names of the pupils will form stories that may be written on the board by the teacher and read by the pupil. Dr. Rice speaks of a model primary school, where a class was called up to read and the reading book was a flower. It is an interesting game to tell a story, then have the children each write their own version of it. The teacher will find it a pleasant diversion to have the reading lesson told by the children in pictures drawn by themselves, instead of writing the lessor and which they must explain orally before the class. Have each illustrate the mental picture he gets from reading the book story.
Guard against too close confinement to the book. Reading is not calling words, and it is a mistake to have each child read one sentence, even though everyone may not have an opportunity to read every day. Special stories may be assigned to different ones in succession. Thought getting and thought giving is the prime object of reading.

Phonic drill should be given with each reading lesson. Words written upon the board by the teacher should be pronounced and spelled phonetically to impress the sound and to emphasize the correct pronunciation. Later, when the child has gained some skill in pronunciation, drill by having one child name a root word, and the others as rapidly as possible suggest prefixes, then suffixes, to form different words, the teacher writing them as given. Diacritical marks should be used in these exercises to show the pronunciation. Give simple work that the children can understand, and insist upon correct pronunciation. This exercise will aid the child in recognizing words readily, thus improving the slow reader.

The success in teaching children to read depends largely upon the ability of the teacher to present the lesson in an interesting manner, and untiring energy and persistent effort daily will enable the child to read in a short time.

Train children to repeat exactly what is said; this quickens the memory and predisposes to truthfulness. It becomes a pleasant game when taken up in class. Before the reading lesson, all hard words and every new word should be written on the board, spelled phonetically, and the meaning of each made clear, and by way of variety, used as a spelling lesson. The children may also give oral descriptions of object lessons that have been presented to them. These descriptions being written on the board as given by the children, the whole may be used as a reading lesson for the class. Stories told by the teacher or read to the class may be reproduced by the pupils and read by them after exchanging papers with each other.

Another variation of the reading and language work will be to let the children exercise their powers of imagination. Have each write a story of his own composition. Lessons written from dictation, given by the teacher will be helpful, and should be given every day. The smallest children should write letters to their parents or friends once a month.

A child's knowledge of words and of nature or objects should be in advance of his reading. The "Committee of Fifteen" sets the teaching process on the content rather than the form. Remember that the Indian child can not talk in English until he can think in English, and that reading and writing are not ends, but means for acquiring other knowledge.

The following directions for conducting a reading lesson, clipped
from the Southern Workman, will interest the thoughtful teacher:

"The teacher wrote on the board the words, *kit*, *white*, *high*, *wind*, *makes*. The children pronounced these quickly and distinctly, after which the books were opened to a lesson on flying kites. As each sentence was reached the teacher put a skillful question, suggesting the thought to be found in it. The pupils reading to themselves got the thought out of the sentence, then read it to the class, not before. After the stories had all been read the books were closed, and a small boy drew a picture of a kite on the board, and the story was retold. The teacher was bright and animated, and the children were learning to read, not to call words."

Guard against too close confinement to the book. A teacher whose eyes are always fixed on the printed page is apt to lose the ability to judge of her pupils' power of expression and distinct utterance. She unconsciously makes allowance for small errors, understanding through her eyes instead of through her ears. Some one in the class should listen without a book and insist upon understanding all that is read. It is a mistake to let each child read one sentence in the lesson. True, there may not be time for each one to read every day, but the difficulty may be obviated by letting one child read the lesson each day, assigning special lessons or stories to each child.

The teacher must thoroughly prepare her lesson and know what good reading is. Attention should be paid in every lesson to pronunciation, thought-getting and thought-giving, expression, emphasis, and volume. It is a good plan for the teacher to decide upon her course of reading four weeks in advance, marking out definitely the lessons for each day of the week. Before each recitation the hard words should be written on the board and their meaning made clear.

Correlate reading and language, thus adding to the interest of the lesson.

After any kind of object lesson a description should be written by the children, or given by them orally, and written by the teacher on the board, then used as a reading lesson.

Unimportant mistakes should be passed by in reading. Do not correct the child while reading and do not prompt him.

The constant criticism from every part of the field is that pupils do not read loud enough to be heard, and from the start teachers must train the child to read so as to be heard distinctly from any part of the room.

It is a good plan to have children give at least one original sentence every day, which should be written on the board by the teacher. Conduct conversations on the industries of the school.

Letter writing should begin as soon as the child can write. What child is there who has not a request to make or a difficulty to settle? The little one whose hand is raised may make his request in writing,
beginning, "Dear Teacher." Teach the use of comma and period. Teach the child to distinguish between proper names and common names and to give the plural forms of words; to use this and that; these and those; is, are; was, were; have, has. Teach the use of capitals at the beginning of sentences and proper names and in writing the pronoun I.

Endeavor to enlarge the vocabulary and to help pupils express themselves in good English. Correct wrong forms. Require pupils to answer questions in complete sentences.

Give daily phonic drill, giving lists of words in phonic order. Drill on sounds not mastered. Never pass things not understood. See that pupils understand the meaning and use of all words in the lesson.

Use first readers and supplemental readers, and pursue the blackboard drill method with the supplemental readers. Then review the book without such drill.

Accustom children to give the content of lessons where any thought is elaborated, and encourage them to add to the thought. After expressing a thought have each child write it.

Sometimes ask children to make sentences true; as, "I will fold my arms," is written on the board. The teacher says: "Juan, make the sentence true." Juan folds his arms.

When children perfectly understand what this making true means and have acquired skill in doing it, the practice may be utilized to teach silent reading. Assign for seat work a reading lesson that can be acted, then call on some child to make it true. This habit of silent reading is an important one, because it is never acquired in the home of an Indian child as in other American homes.

Resort to devices to improve children's articulation, and compel children to read loud enough to be heard in any part of the room.

**Third Year.**

The teacher must carefully study pupils individually in order to supply their needs. Especial attention must be given to articulation and enunciation, pronouncing words slowly and carefully. Insist upon open mouths and clear natural tones. Give backward pupils special drill, overlooking the needs of none. Vary methods until you find the remedy for the defects of each.

Have pupils tell what they observe, write what they observe, and read about that which they have observed.

Have pupils tell what they hear, write what they hear, and read about that which they hear.

Have pupils read what they write.

The aim of all reading, "mastery of thought and ability to read with expression," should now underlie all training. Drill in ready recognition of phrases is still essential, especially all new phrases.
New words at the head of the lesson must be drilled on the board; their meaning found. They should be spelled phonetically, emphasizing the sounds, and they should be put into many sentences original with the children.

Silent reading should be greatly encouraged. Sometimes make it the only reading of the morning, and have the recitation consist in pupils giving the contents of the lesson in their own words.

Test the child's progress by giving him selections from any second reader to read. Give pupils stories to read out of class and have them tell orally in class next day what they read.

Occasional poems and extracts adapted to the grades may be memorized and recited for drill.

Compositions must be written each week on the work accomplished, emphasizing the new thoughts presented and the new features learned that week.

Dictation shall be given daily by the teacher. It is expected that each pupil shall make a cookbook, containing receipts for cooking everything served in a well-ordered home. These will necessarily be simple this year, and may be written from dictations given by the teacher. The cookery book must contain simple receipts.

Each child must make a book of drawings, of tools used, stitches taken, and directions for sewing, as done in the class room. Sample bits of cloth may be added, showing the actual stitches. This book must contain descriptions and drawings of garments cut, fitted, and made, with full directions for making each and patterns of each part drawn.

Each child is expected to make a book showing everything learned in class room and in laundry work, also containing drawings of utensils used and of pupils engaged in the occupation, showing the different stages of the work. The teacher must by drawings show the children the correct way to fold each garment after ironing. A full account of the whole process from taking the articles to the laundry to sending them out must be written in this book.

The dictation lessons in gardening will be very full and complete, so that each child may make his book of notes on this subject interesting as well as comprehensive.

In woodwork the dictation lessons will explain the work, so that any subject may be used as a reading lesson, and the child be able to see before his mind's eye the work as it has been done by him.

Correlate geography and history, using geographical and historical readers occasionally.

Keep list of words in common use misspelled by pupils for daily reference in a conspicuous place on the board.

Watch language used in recitation and keep list of mistakes made generally.
Endeavor to correct individual mistakes.
Teach use of personal pronouns with different forms of verbs, *am*, and *have*.
Continue letter and sentence writing, drawing thoughts from objects around the pupils and from their studies. Of course the work at first must be very simple, but there should be some gain every year.
Do not neglect punctuation in connection with reading and writing.
Give phonic drill daily, and exact reading loud enough to be heard in any part of the room.

All teaching of grammar must be in the closest relation to composition and reading in all lessons, a means to intelligent mastery of spoken and written language, not as an end in itself, omitting all that does not help the pupil's speech and writing.¹

**FOURTH YEAR.**

Use second, third, and supplemental readers this year.
Before taking the books, select words to be pronounced by the children as a result of phonic and other drills. Go through them with a slow and distinct pronunciation, then more rapidly.
As in all previous grades, new words should be drilled, both as to meaning and the placing of them in original sentences or phrases by the pupils, using such sentences as the children are likely to use in everyday talk.
Have the sentences written on the board and the best sentence from each child's work copied and preserved. Give one of the new words to each of the children and let him select for supplemental reading a sentence that makes use of his word. This will help him to understand the use of books, besides generalizing the application of what he may learn.
Where possible, illustrate the reading lesson by what is learned from other departments of the school.
Have silent reading of the lesson and the content given in class. Be sure the child has the thought of the book, as that is now the center of work. Use geographical and historical readers occasionally.
Teach abbreviations of names of days, months, a. m., p. m., etc., family names and individual names.
Punctuation marks in reading and writing.
Correct use of the verbs *eat, see, sing, write*, etc.
Simple sentences.
**Letter writing.**—Different forms for the beginning and end of letters.
Give exercises in which the pupils change the expression and retain the thought. Describe pictures orally and in writing.
The dictation lessons this year will be more advanced than last. The cookbooks, manuals of gardening, laundry, agriculture, dairying,

¹ From Carlisle Indian School course of study.
woodwork, sewing that the children shall write from dictation given by the teacher must be fuller and cover more ground than those of last year.

The teacher must bring newspapers into the schoolroom occasionally, to let the pupils become familiar with reading fine print, the teacher picking out here and there a paragraph for their reading lessons. Teach pupils also how to look at headlines for news items.

**FIFTH YEAR.**

Use third and fourth readers.

Follow suggestions given in previous grades. Read for information; train to read and to think at the same time, both in the class and at the seat.

Illustrate by object work and historical stories. Teach the use of books. Drill all new words from the board. Learn the meaning and have each word properly combined with others in original sentences. Aim to make fluent and intelligent readers and develop the motive to make everyone within the room understand the thought expressed.

Train the child in the use of the dictionary. Show him the value of diacritical marks, etc.

Do not interrupt the child while reading to correct him. Note the fault and give a lesson on same to the class from the board.

Be sure that all children read loud enough to be heard in any part of the room.

Train to good habits. Continue work in letter-writing this year.

Business forms.

Teach the division of words into syllables; quotation marks; hyphen in compound words, and at the end of a line when a word is divided; caret; period.

Develop orally the names of nouns, pronouns, and adjectives. Give a verb and call on a pupil to supply a noun or pronoun. Expand sentence by adding adjective.

Teach the correct use of the irregular verbs, bring, take, lay, sing, teach. Train correct pronunciation. Teach abbreviations and contractions.

Accustom the children to reading newspapers. Bring them into the class oftener this year, and have the children become familiar with looking for the news, the current events, the editor's comments on the same, the grain, fruit, and stock-market reports. Show the importance of the advertisements to the one who advertises as well as to the one who reads. But little more than headlines can be accomplished this year in this direction, but a desire for and interest in newspaper reading may be created. The pupil is being prepared for citizenship, and he must be taught the dependence of man upon man and the value of the press. Endeavor to have him feel an interest in watching the changes in the prices of his products and the advantages of raising
what will bring the best prices the market offers. Show pupils the importance of subscribing to a good farm journal which gives general information on crops, plant diseases and remedies, care of stock, care of poultry, and general information of interest and value to the wide-awake business man.

After the children have been carefully trained they will be able this year to write an essay each week setting forth the work of each department, and by the end of the year to have completed, almost unaided, a book on each subject.

This year pupils should be able to conduct a laundry, take charge of a kitchen, getting meals for a small family, preparing vegetables, fruits, and meats in season, and putting by each season what will be needed for the next. They will be fully able to lay out and plant a garden and raise everything that the soil and the climate will produce. It is expected that the work each year shall be compared with that of the year preceding, the teacher noting where the child needs strengthening and where he has improved over last year's work, that he may be shown his improvement and how to overcome the difficulties that arise. Growth and improvement must be the watchword, and a constant determination to make the pupil self-reliant, putting him in positions where he will be expected to lead and where he will be given responsibility, and showing him how to be able to take it.

**SIXTH YEAR.**

Read for information. Study the definition of words and get the exact meaning of each, where there are two or more of a similar meaning. Follow the suggestions of previous grades.

Use the Farm Journal, the Poultry Magazine, the newspapers, and similar matter for readers.

Continue letter-writing and give business forms. Write bills of goods and receipts.

Teach simple, compound, and complex sentences; the use of shall and will; study of words of similar meaning to find exact meaning of each, as wish, want; look, observe.

Composition work and dictation, based on subjects showing the important industries of the locality, on the necessity of preparing for the future. With the allotment in view, plan what shall be done on every foot of ground there; what shall be raised here, what there, and why; what shall be planted after one crop is taken off; what after that. Study the rotation of crops most successfully followed in the locality. Observe what the land produces best, and let the greatest proportion of the mental strength be devoted to making the land yield every dollar possible.

Have compositions read before the class. Criticise English, plans, and ideas, and stimulate the pupil to effort to make his particular farm the most productive one in the locality.
SEWING.

Under this is embraced every branch that is taught the pupil where the brain and hand are both employed. Training the eye and hand together impresses facts indelibly. "Learning by doing" is the watchword that must be kept in view and put into practice in dealing with little children, to whom our words are often meaningless and who are themselves learning to speak as well as trying to think in a new language.

Manual training includes cooking, laundering, sewing, agriculture, carpentry, shoemaking, blacksmithing—everything that strengthens the brain through the skillful use of the fingers. Sewing is one of the simplest lessons in manual training that can be given the small child. The tools are light, easily handled by the smallest child, and the educational value of the work can not be too strongly impressed.

All civilized nations have obtained their culture through the work of the hand assisting the development of the brain. Basketry, weaving, netting, and coarse sewing were the steps in culture taken by primitive people.

Sewing has been placed in the school curriculum to give each child the opportunity to use his hand and his will in making useful articles.

The salvation of our boys and girls is to be effected through industrial training—the training of the brain through the hand. They need it as individuals and as a whole, and we must present it in such form as will be most helpful to those who need to "husband their resources" and endeavor to show them how to economize in using what they have and not to destroy good material. It is our opportunity to select the most useful work for our schools, laying the greatest stress on the work attempted. Our sewing schools must teach the girls to be of service to themselves, to save them from lives of idleness and wastefulness. A knowledge of sewing means a support for many.

Skill in the art of using the needle is important to every woman and girl as an aid to domestic neatness and economy and a help to profitable occupation. The demand for teachers of sewing is so great among the Anglo-Saxon races that such schools as the Teacher's College, of New York City; Pratt Institute, of Brooklyn; Drexel Institute, of Philadelphia; Armour Institute, of Chicago; and many others, have taken up this most important branch of domestic science. Then how much more important and how much greater the need for our
Indian schools that are preparing a race of people not inheriting the civilization of generations of ancestors for useful lives!

The teacher of sewing must be trained in every branch of needlework, having the ability to plan and make garments by measurement. She must be an expert in the use of her needle and know the principles upon which every stitch is based. She should be well informed as to the process of the manufacture of the different articles and materials used in the work, and she must be so qualified in her language as to be able to give intelligent talks and explanations to her classes on these subjects. Her knowledge of drawing should be sufficient to enable her to illustrate a lesson clearly by means of the blackboard. She should provide herself with books and specimens, as an aid to self-improvement, and devote a good portion of her time to the preparation of her lesson. She should thoroughly understand what she is going to teach before she enters her class room. She should be a person of extreme neatness, for in this one trait she will teach a great lesson. She feels that at the same time she is training a pupil in sewing she is making some impression on a human soul.

It is necessary that sewing teachers be wide-awake women, using the greatest precaution in the execution of their work. Such careful instruction, together with a knowledge of the origin and manufacture of the articles and the materials used, has made needlework as scientific and important a study as any branch in the educational world to-day.

The object of all this training and expenditure of money for industrial training is to make our girls useful and self-supporting women and good citizens, so that when they enter homes as wives and mothers they will be properly trained for the great responsibility of womanhood and motherhood.

Sewing is an aid to the building of character, making industrious, capable, independent, and happy women.

The mind must be thinking about the work the hand is doing. The judgment needs to be trained. Let the child decide for himself if the work is good or bad. At first a beautiful model will not result, but gradually the judgment will improve and the work with it. The ability to distinguish good work brings a desire to produce it. The textiles on which sewing is done may be an aid in correlation. The way things are made is of intense interest to children, and the teacher can easily make their history and manufacture a part of the lessons in history, geography, mathematics, etc., and through the right presentation of the subject will come sympathy with and respect for labor.

Skill in the use of the needle is important to every girl and woman as an aid to domestic neatness and economy and as a help to profitable occupation.
First impressions are lasting and the teacher can not afford to be careless. No branch of the work must be slighted. Teach every stitch on the proper material.

During dark, rainy days when sewing classes seem to grow tired, the theory lessons will be opportune—lessons on pins, needles, and the like.

When cloth is first put into the child’s hand, the attention should be called to threads and the general plan of weaving. Pupils will work more intelligently by having some knowledge of the origin and manufacture of materials used. Talks on different textiles should be given frequently. Classes must be constantly reminded of the different stitches used in their work, their relation to one another, and when each stitch should be used. The rules governing the construction of seams and hems and the laying of tucks should be given daily. All tendency to a great amount of trimming should be discouraged and should give way to the better and more refined finish of plain hems, tucks, ruffles, and handsome stitches. Too much can not be said in behalf of the educational result of this training. It cultivates in a girl a character made up of thought, care, precision, neatness, self-reliance, individuality, refinement of taste, and a higher appreciation of time and its opportunities.

On the teacher’s ethical aim also depends the educational value of the work. If the aim is simply to complete good models, the building of character through the hand will be small. The powers developed depend upon the content of their aim. If the object is to make children efficient for good in the world, the teacher must study their characteristics and interests. She must see to it that the child’s will power is at work, and that she has thought out for herself every step in connection with the article in hand. She must have a purpose in the making which can be carried out, that gradually she will come in touch with the world of workers and desire to lend a hand. Working with this spirit, the teacher will find the children in her classes growing into active, thoughtful helpers.

The instruction in sewing begins when the child enters school. Under the direction of the class-room teacher, the little ones are given a regular course of stitches throughout the year. The care of the dolls will afford ample opportunity to put into use the several stitches taught. In making dolls’ sheets, pillowcases, tablecloths, napkins, etc., the children will discover the use of the hem. Curtains, draperies, etc., will show how useful it is to have the gathering stitch. Before the doll’s wardrobe is completed the uses of basting, running, overhanding; and other stitches will be clearly demonstrated, and in such a pleasant way that it will not be long before the children will be able to use the needle with dexterity, telling the names and recognizing the
uses of the different stitches. The teacher will use the blackboard freely in illustrating each step of the work. Instead of outlining designs on sewing cards, the child is learning to sew, at the same time making a toy, in which it always delights. Thus the play spirit is fostered while the work habit is being formed.

When the children have gained skill in the handling of the needle, which will be in about three months after they enter school, each week they will bring their hose into the schoolroom and darn the same, thus inculcating habits of neatness and system, and learning early in life to do the things which must be done systematically in the home.

Half an hour a day will be sufficient to devote to the subject of sewing for the first three months. After that the time may be extended to three-fourths of an hour, in the discretion of the teacher.

By writing to the manufactories the teacher will easily obtain many pictures showing the different stages of the manufacture of cotton, wool, and silk. These can be substantially mounted and used in class from time to time illustrating talks. The factories send out pamphlets, giving the story of needles, pins, thimbles, thread, etc., which may be helpful to the teacher in making the lessons interesting and educative.

As the time of the seamstress will be fully occupied with the work of keeping up the sewing of the school and instructing the classes in needlework and cutting and fitting, she will not be able to devote any attention to teaching the smaller children to handle the needle. It is designed, therefore, to give the children regular and systematic training in sewing in the class room, in order that when they are old enough to be detailed to the teacher of sewing they will be able to take up the work intelligently and help not a little in doing the work for the school. At the same time they are ready for further training, as given by the seamstress in the sewing room.
THE SEWING ROOM.

It will be unnecessary to lay down the work to be accomplished year by year in this department, since the teacher of sewing is expected to keep up the sewing of the school each year, and this will necessitate working to meet the demands of the school.

The seamstress will see that the class-room teachers are provided with work for their classes in sewing, which are to be conducted daily, and which will, in turn, materially assist the sewing room in accomplishing the work to be done.

By planning and having work cut out ahead, the various classes can easily be kept supplied from day to day with such work as they will need in teaching sewing progressively in the class rooms. The seamstress will thus find her burdens materially lightened and much of the sewing of the school accomplished in these class lessons. It is expected that small scraps from the sewing room will be saved so as to provide the teachers with material for stitches. In no instance must new cloth be used for this purpose. For doll clothes large pieces left from cutting garments will answer.

Pupils will come to the sewing room understanding how to sew, and must never take up the time of the seamstress in showing them how to actually use the needle. The seamstress will instruct the pupils in the careful use of sewing machines and supplement the instruction given in the class room in measurements, drafting, cutting, and fitting. Every child must learn to draft and cut patterns from measurement in the class room, but should the seamstress find pupils unable to do this work unaided, special stress must be laid upon instruction in this most important feature of the work. No girl must leave the sewing room at the end of the year without being able to draft, cut, and fit garments of all kinds.

The seamstress must endeavor to inculcate habits of neatness and care. The large detail of girls under her direction each day must be taught how to sew well everything that comes into the department. Give each a variety of work, keeping her on one kind until she has gained proficiency in that special work. Let each girl work on every part of garments, that she may be able to construct the whole alone and unaided.

The seamstress will see to it that all girls thoroughly understand all stitches used in hand sewing and have plenty of practice in sewing on machines, so that they will know how to sew carefully and rapidly. Teach the care of the machine and how to use all the attachments to machines, and if there are several different kinds of machines in the school, to be familiar with the difference found in different makes.

The drafting from measurements, cutting, and making of under-garments should be given before that of dresses.
The making of simple dresses should be taught first, then more complicated, lined dresses.

Teach children to measure and cut towels, sheets, and pillowcases. Teach them the number of yards in a sheet, in pillowcases, and the length of towels. Teach hemstitched hem on these articles. Teach also the difference in the hems for the top and the bottom of sheets.

Instruction in designing dresses must be given, showing how necessary it is to think what the dress is needed for, how much and what kind of wear it is to have, will it have to be laundered often; and the style will be suggested largely by these points.

Teach measurements, then the drafting, cutting and making of pants, coats, and blouse waists for small boys, also of shirts and drawers for boys and men.

The sewing room is expected to make clothing for all pupils, bedding where needed, and bed linen, napkins and tablecloths, towels, handkerchiefs, curtains, aprons, the patching, darning, and mending of all garments and hosiery, the making of jackets and capes, or whatever wraps may seem best suited to the needs of the climate and conditions, and all sewing that may be needed for the comfort and welfare of the school.

Each pupil in the sewing room must be equipped with workbags or boxes, which shall contain her own needles, thimble, scissors, emery, tape measure, thread, and all tools that she may need for sewing. The individual ownership of these tools must be insisted upon and nothing must be permitted to be lost without fixing the blame where it belongs and holding the owner of each outfit, given her at the beginning of her career in the sewing room, responsible for the tools in question.

The teacher of sewing must bear in mind that the children she is instructing have but a brief period to spend in this work and that they must be equipped with what they will be able to use to advantage when they return to their homes. Think of what the conditions there will be, what kind of material the pupils will have to do with, their needs; then give them helpful instruction along the line of their home needs. Impress the need of ability to make durable, comfortable garments, and the lesson of paramount importance has been taught.

After the pupil has had the course in the class room and the careful training the seamstress will give her, it must be expected of every girl before leaving school that she will be able to cut, fit, and make every garment that will ordinarily be needed by men, women, and children.

Give all work systematically; thus, in teaching dressmaking:

Teach—
2. Measurements for gored skirt.
3. Cut pattern.
4. Cut lining.
5. Cut material.
6. Face lining with canvas (if canvas is used).
7. Baste lining to material.
9. Fit.
10. Stitch seams.
11. Take out basting, trim (if necessary), press.
12. Finish seams by binding, overcasting, or any neat way.
13. Face lower edge with velveteen or other facing.
14. Finish flap and fly, 9 inches deep, fly 1 inch wide.
15. Make and put on band.
16. Sew on hooks and eyes.
17. Sew on loops, mark center.
18. Make and insert pocket.

Collar:
1. Take measurements.
2. Draft collar.
3. Directions as to how collar is made.

Sleeve:
1. Take measurements.
2. Draft sleeve.
3. Cut pattern and pin together.

Plain waist:
1. Take measurements.
2. Draft waist back, side form, under-arm, and front.
3. Cut pattern.
4. Cut lining.
5. Cut material.
6. Baste lining to material.
7. Baste parts together.
8. Fit.
9. Stitch all seams but under-arm.
10. Fit again.
11. Stitch all seams, take out bastings, press.
12. Trim, notch, and finish seams.
13. Sew on hooks, eyes, and whalebones.
14. Turn up edge of waist at bottom one-fourth inch. Use bias strips of canvas one-half inch wide for firmness.
15. Catch stitch edge to canvas.
16. Face fronts and lower edge with bias strip, bind neck and arms eye.

The sewing room must be provided with lapboards, pressing boards, and sleeve boards.
Give class talks frequently on:
1. Machines: Kinds, use, tension, wheel, stitch.
2. Skirts: Kinds, facings, finish, length.
5. Waist: Kinds, size, fit, and finish.
6. Patterns: How made, styles, measures, systems.
8. Linings: Percale, cambric, canvas, haircloth, cross-barred muslin.
9. Waist findings: Whalebones, casings, belting, binding, shields, buttons, hooks and eyes, etc.

Give talks also on healthful dressing and proper wearing apparel.

FIRST YEAR.

It will be interesting to raise cotton plants in the windows where possible, giving the children practical illustrations of the growth and production of the cotton plant.

Give the children unbleached muslin to work on at first, since it is best, being soft and easily handled.

Let the little children sew on buttons at first. This is easy and gives drill in holding the needle.

The straight stitches are taught first.

Each child must be provided with pencil and paper, and before attempting to give any stitch with the needle, the teacher will illustrate the lesson on the board, the stitches to be taken, the needle and the thread. Write the words, "sew," "needle," "thread," "spool," which will be another way to draw the tools or "to say it with the pencil." English is easily taught the children in this way.

This drawing may be done alternately at the board and with pencil at the seats, the lesson lasting no more than five minutes.

The different stitches, spools of thread, thimble, scissors, material to be sewed and all articles made, as well as all drafting of patterns given, will form a series of interesting subjects for the drawing, writing, and English lessons throughout the year.

In teaching children in whom the ambition to become good homemakers must be instilled, the utilitarian idea must never be lost sight of, but must be inculcated with the play spirit in all school work. When learning to sew make things that are needed and will add comfort and pleasure to the household and to the family life. Durable as well as useful should also be the watchword. In planning work for the class the teacher must give careful thought to the condition of the homes of the children and their needs, and carefully prepare work that they will actually have to do when they go back to their homes.
Make articles that are actually needed for use in the school. Teach the child to appreciate the value of time, and show that it is quite as easy to learn to sew by making useful things as by making articles that are unnecessary and useless and whereby time and material are lost.

The children should be supplied with materials to make boxes, envelopes, or bags in which to keep their thread and thimble, a pincushion for needles and pins (which they themselves shall also make), a tape measure (which they must also make), and the work under construction. The teacher may pass the scissors around among the little ones until they have learned to use them carefully, after which each child may be provided with his own scissors.

The making of a tape measure for the sake of learning the principles upon which it is based is very good practice for a child, but it would be impossible for her to make a tape measure accurately enough for actual use. Accurate measurement is one of the first things we need to teach, and the medium used in the class room should be very clearly and accurately constructed.

Never permit sewing without a thimble; do not let the children make knots in the thread; require clean hands; see to it that all sit in an erect position, never resting any part of the arm on the desk; do not allow the work to be put to the mouth; biting threads must not be tolerated.

Explain that sewing is work, the needle, thread, and thimble being the tools.

Drill in—
- Use of thimble.
- Length of thread.
- Threading needle.
- Motion of arm in taking stitches.
- Taking stitches.
- Fastening thread.

Drill in use of emery and holding scissors.

Give—
- Basting.
- Running.
- Combination stitch.
- Overcasting.
- Hemming.
- Weaving.
- Sewing on buttons.
- Principles of darning.

The introduction to the backstitch may be given by the combination stitch, or three running stitches and a backstitch, which is not so difficult, and is strong enough for all purposes of the first year's work.
To inculcate habits of neatness and economy have empty spools for every child on which to wind bastings and left-over pieces of thread.

The workbags that the children must have may be woven by them out of long strips of cloth cut and sewed as "carpet rags" are prepared. Use old slate frames, or a frame may be made by nailing four sticks, thus:

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The warp of cord (or of the strips of cloth, if cord can not be procured) should be strung lengthwise. Then weave in the woof of the prepared strips. When the required length is woven, take it out of the loom, double it in the middle, sew up the edges, put in a draw-string, and a good bag is the result.

Preface all lessons in sewing with a drawing lesson lasting not over five minutes in duration, illustrating work to be done.

Give daily talks on tools, textiles, sewing, and general information relative to the lesson.

At the end of each week have the children write a story of the work done, in the form of a composition.

Keeping the utilitarian idea before the child is an important point; at the same time she must learn the principles of making the simple stitches, which should be practiced over and over again. The method of presentation should be varied as much as possible in order to keep the interest of the child continually awakened. The making of simple doll garments from tissue paper is very good practice, because the child must of necessity use great care in the handling of material.

Work to be accomplished:

Making samples of simple stitches.
Drafting, cutting, and making doll clothes from tissue paper, from cloth.
Learning things of interest about the materials and tools used in the class room.
Hose darned.
Clothes mended (simple work on personal garments).
It will be well to have a drill for opening and closing the exercises, encouraging order and system at every stage of the work.

Opening:
1. Take thread (spool).
2. Break off thread, not over half a yard.
3. Twist end of thread.
4. Pick up needle.
5. Thread needle.
6. Take up thimble.
7. Put on thimble.
8. Take up work.

Closing:
1. Lay down work.
2. Take thread from needle.
5. Fold work.
6. Put work in bag.
7. Put tools in bag; put bag on desk.
8. Sit erect, hands folded.

Have bags collected (keeping them in teacher's desk).

This or any drill the teacher may prefer will be advantageously used.

Use only coarse thread at first for little children. The teacher can easily make a small loom and let each child weave an inch or two of cloth to understand the process.

A piece of cardboard with holes in the opposite ends, through which threads are drawn, representing the warp of material, must be prepared by the teacher (like illustration), and placed in the hands of each child.
The needle is used as a shuttle to carry the woof back and forth. This is the first lesson given the child in handling the needle, and is also the first lesson in darning.

Another way: Pierce holes in the opposite ends of a box about 6 inches long (size is of no consequence, only let it be a size convenient for the child to handle); draw strong threads across through the holes; give the child a darning needle with thread, wool, or cord, and teach him the weaving stitch, letting him weave a long strip of textile.

With this experience in the use of the needle the child will be better able to handle the needle in cloth; to sew.

1. Give the straight stitches first, beginning with the basting stitch. Exact even basting, straight lines, and stitches alike on both sides. For very small children it is well for the teacher to prepare strips of cloth before coming to class, marking to show the child where to put the needle, thus:

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When the little ones can use the needle with ease, they will have gained sufficient confidence in themselves to use judgment and make the lines straight and the stitches even. Use colored thread on white cloth at first. It is easier to see the stitches.

2. The gathering stitch, spaces twice as long as stitches.

3. The running stitch, spaces and stitches even.

When the children know this stitch, practice on it may be given in a pleasing way by preparing designs—at first simple squares, circles, etc.—on cloth for the child to outline in the running stitch. As the child increases in skill the outlines may be familiar objects, the child selecting the colors and combinations, using the right color for each part of the design. The judgment will thus be trained. The children have learned enough stitches now to make a workbag to keep their tools in; also their work.

The seamstress will supply the teacher with scraps at all times for use in the classes. When the sewing bag is made and the teacher has marked each one with the owner's name, a strong, durable receptacle, which will last throughout the term, will have been provided for the work.

The teacher will give talks every day on thimbles; needles; the cotton, from the seed to the dress worn in the schoolroom; the wool (of which the best dresses are made) from the sheep down to the cloth; and of silk, from the cocoon to the hair ribbon which the children wear. Have the children tell the story afterwards with pencil as well as orally. Explain the difference between raw edge and selvage. Show how graceful easy whole-arm movements result from continually putting the needle in the work and drawing it out.

4. The half-back stitch will be a little more difficult to master.
5. The whole-back stitch, which looks like machine stitching when well done, also needs to be carefully learned.

6. Overhanding is the last one of the straight stitches.

The slanting stitches will follow:

7. Overcasting, and

8. Hemming. Teach the difference between a true and a false hem, or facing, as it is sometimes called.

In giving the stitches as outlined above, do not give a new one until the one first given is mastered. Practice on quilt pieces will soon give skill in one, and the child is then ready for another.

In giving the work in making doll clothes this year the kindergarten system of drafting, as outlined by the Vienna ladies' tailor system, will give the teacher full directions for drafting the patterns in such a simple way that the smallest child will be able to follow the directions. The outline is complete, and the teacher will be able to make such simple outlines on the board that the children will readily understand them and be able to copy and cut the doll clothes, first out of paper and then from the material to be used. The lessons on the stitches will be practiced in making the doll's wardrobe.

Have classes in sewing daily during the first half of the term. The formal occupations of card sewing, weaving paper mats, parquetry, etc., will be supplanted by the more practical and less fatiguing work of cutting dolls' patterns, sewing dolls' clothes, crocheting, basketry, quilt making, etc., all of which work may be diversified pleasantly and enjoyably performed by the little children. Do not allow them to become fatigued; stop every lesson while it is interesting. Exercises in marching, breathing, calisthenics, and appropriate games may be given between classes to give the requisite muscular exercise so necessary to the unfoldment of the child.

The celebration of holidays and birthdays of prominent people whose lives and work for the human race need to be impressed upon the mind of the child will furnish material for sewing and basketry; such as making flags and other emblems for Washington's Birthday, etc.

After the 1st of January the pupils will have had enough drill in sewing to be able to handle the needle with ease, and they will now darn their own stockings. The matron will have the hose ready for the class-room teacher each week, and the children, both boys and girls, will be systematically trained in neat habits. The pupils in this class in sewing will also be able to help the sewing room. They can hem napkins and towels, sew up seams, and make hems in aprons and other simple articles.

Toward the end of the year the little seamstresses will make a book containing samples of all stitches learned throughout the year. Samples should be of uniform size and mounted so as to be easily preserved.
Have quilt squares always ready to give the children to sew in order to diversify the work, as well as for drill in the different stitches. Running, half-back, and whole-back stitches can be practiced on such work very nicely. Let the squares be large so as not to have to break off the thread so often. Carefully instruct the child in fastening the end of thread before breaking it. In piecing quilts the children may use knots in the thread.

At each lesson the teacher will give short talks on some tool used in sewing, or on some subject relating to the work in hand. These talks will form the subjects of compositions which shall be written by the children each week on "Sewing," and kept by the teacher as an important part of the work in sewing.

SECOND YEAR.

The talks of a few moments each day will form part of the lessons in sewing, correlating geography, history, and other studies with this work. The drawing lessons also will form part of the lesson, giving the stitches, tools, textiles, etc., as advised in the first part of this subject. Each week darning the stockings and mending the clothing used by the pupils will be carefully attended to by the class-room teacher. This work will be practical material on which to teach the different stitches, patches, darning; and will be most valuable training, having the utilitarian idea in view.

With a little practice on the stitches, first on small scraps then on the quilts, the little pupils will be led to see what this is given for and the necessity of doing such work systematically and neatly. There will be ample time to accomplish so much in this direction that early in the year each child will be able to take care of the mending of her own clothing, and later assist in doing that for younger ones, even as the mother has to look after this work in the home.

When the pupils are older it is designed that they shall not only mend and patch but make all of their own clothing.

WORK TO BE ACCOMPLISHED.

Stitches mastered.
Hose well darned.
Garments mended.
Quilt made.
Drafting simple patterns for doll.
Knitting.
Crocheting.
Drawing.
Compositions on work.
Books of samples.
Before taking up any new stitches it will be well to give the pupils a review of all that were learned last year. First in practicing each on scraps of cloth, then in making as much of any simple garment that can be secured from the sewing room (the seamstress always appreciates help) as the stitches learned will accomplish.

Have quilts to piece this year also for practice work, making squares smaller. When the teacher feels that the stitches given are well remembered, new stitches are in order.

1. The fell seam, which is so necessary to know when neat sewing is the object in view.
2. The French seam.
3. The plain seam overcast on the wrong side.
4. The catch-stitched seam on both wrong and right sides. All these seams can be practiced in quilt making.
5. Patching. This will furnish most practical lessons for the children. Give lessons on patching, practicing first on scraps until the child has some idea of hemming on the patch.

The matron will be able to supply the class-room teacher with articles that require patching—sheets, pillowcases, dresses, gowns, tablecloths, napkins, and many other necessary articles that need to be mended each week. This will give the pupil valuable drill in patching and also lessons in economy. A little given each day will show the value of a patch and a knowledge of doing it in the best way. Many household articles and much wearing apparel can be made to last much longer, the appearance improved, and money saved every time an article is patched.

Where stripes or checks or designs are found in the material being patched, the teacher will show the child how to match lines, designs, and checks so as to make the patch invisible as far as possible. Do not be discouraged if the patches are not perfect at first. Impress, however, that when a patch can be put on so as to show as little as possible, it has been done right, and only then.

Sewing schools all over the country show well-executed work, neat stitches, and good substantial patches done in schools by very small children of the Anglo-Saxon races, and how much more is it necessary that our Indian children should receive careful training in this direction! Surprising results will be obtained from very small children where pains are taken by the teacher in presenting the lesson in an attractive way.

6. The ruffle. This will be cut in paper first, turning down the very narrow hem for a narrow ruffle or a wider hem as the ruffle increases in width. Give practice in making ruffles on small pieces of cloth, gathering, putting it into the hem, finishing with the full backstitch to look like machine stitching; rolling the top of the ruffle, gathering and putting on the edge of the hem, afterwards putting ruffles on the doll's dresses, skirts, and aprons.
7. Gathering and finishing with a vent, showing how to finish the top of a skirt, the shirt sleeve, or the front of a gown. Putting the gathers into the band, using these stitches in making the doll's dresses, skirts, and shirt waists.

8. Teach the gusset and the need for the same. Cut a circle out of paper, fold into four parts, thus: (illustrate). Cut, using each quarter for a gusset; fit into place where needed, folding over and hemming down, thus making the most substantial gusset. Practice this in cloth scraps at first, and then in making the doll's underclothing.

9. Teach buttonholes by giving the child a double piece of cloth and have him learn the buttonhole stitch by doing it all around the edge of the cloth; large stitches at first (one-half inch), to be reduced gradually to buttonhole size.

The children should have much drill in darning their stockings.

Each child must make a book of his work during the year. A few sheets of manila or other paper tacked together, or an old copy book, will serve the purpose. Put into this book a sample of each drawing of every stitch taught; also a sample of the work done by the pupil with each stitch. This will prove a valuable reference book and help fix the lessons more firmly in the mind of the child.

THIRD YEAR.

The talks this year in the sewing classes will be an interesting part of the instruction in sewing. The children being older will understand many points that the teacher can now emphasize relative to the production of materials and manufacture of cloth, thread, needles, pins, tape, buttons, hooks and eyes, etc.

The pictures which the teacher will use in class should be looked at carefully and discussed, and will thus afford many valuable ideas. Each child will be expected to present weekly a composition based upon these talks. These compositions will be of much value for future reference. Books of the work must be made during the year, adding each week samples of the drawings and also scraps giving the stitches learned. By comparing the work this year with what has been accomplished in the year previous, marked improvement should be shown. It is not expected that little children will make perfect buttonholes and patches and do darning that will look like the material which is darned; but by preserving the work of the past year the teacher will see just what points need to be strengthened. She will know what lessons must be emphasized, where the most drill is needed, and what first to begin with in the year's work in order to give the child proficiency in the use of her needle and in accomplishing what she individually most needs.

This year we must expect good buttonholes and neat work in everything attempted. Proficiency is to be worked for and care taken to
do well everything that is attempted. The children are old enough to see the need of this and understand the execution.

Pupils in this grade should have a thorough review of all the stitches learned in the previous grades, should be able to write a clear and concise composition on any or all of the said stitches. Master the following stitches and seams:

- French seam.
- Felled seams.
- Gathering and stroking gathers.
- French gathers.
- Plackets.
- Button and eyelet holes.
- Napery hem.
- Putting on bands.
- Sewing on tape.
- Knitting.
- Crocheting.

Also:

- Matching designs or stripes in plain patches.
- Matching designs or stripes in bias patches.
- Matching designs or stripes in flannel patches.
- Drafting patterns for garment work.

This will give the practical application of the stitches learned in this year's work. The utilitarian idea is to be held up constantly. Teach the stitches necessary to be known by using them in the making of actual necessary clothes worn by the children every day. This is a point to be emphasized; learn to make those things needed for everyday wear. The practical application of the work and the urgent need for the same in life is the reason for giving such work. Therefore, we must in every instance follow the lesson by making some article needed in school life to impress early the needs for learning each lesson.

Work to be accomplished:

- Making an entire outfit for self by hand, including union suit, underskirt, gingham dress, apron.
- Book of samplers of all stitches and seams learned.
- Compositions on said stitches and seams.
- Making towels, darning stockings, mending clothes.

Encourage independent work.

In knitting and crocheting, stocking knitting and lace making should be taught.

Good work in patching must be exacted. Designs and figures and stripes must match in every case and neatly patched garments should be considered as desirable as any that could be worn. Teachers can give much practical instruction along this line by wearing the garments themselves that they have made over and mended. The child is
very often a reflection of the teacher, and the example given in this
direction will prove of great value.

The stockings are to be darned in school each week. By arranging
with the laundress, the hose may be ready for the class-room teacher
eyear in the week, and the increased comfort resulting from well-
darned stockings will soon be appreciated by the children. The need
of the matron for these articles the last of the week will necessitate
that they be finished in time. This training in managing is of great
help to the child by forming habits of order and system early.

Ravelings should be used wherever practicable in order to make as
invisible a darn as possible.

\[ \text{Diagram of darns on stockings} \]

In snags like the above, show how darning should be done first in
the angle of the tear in order to keep the goods smooth and to better
make the darn invisible.

In bias tears, the needle should follow the woof or warp of the goods
in order to make a durable as well as presentable mend. The teacher
will have no difficulty in finding enough wearing apparel belonging to
the pupils to give the children much drill in darning on snags at all
angles and in all textiles.

The napery stitch must be taught this year, and the pupils will hem
in the correct way the napkins that are used in the school. It is
unwise to allow napkins to be hemmed on sewing machines. We must
remember that we are preparing these children for life, and each lesson
taught should be given in the best way possible and remembering that
it is for life. We do not wish to teach them what they will have to
learn over again in other places. The napery hem is good practice
for the acquirement of finger skill, and old tablecloths that are usually
cut up into napkins are nice soft material for the hands to practice on.

Much practice in buttonhole making must be given this year, and
also drill in eyelet holes and blind eyes, so useful in dressmaking.
The careful sewing on of hooks and eyes with the buttonhole stitch
should also form part of the instruction in buttonholes.
Sewing on tapes neatly is another lesson to be taught this year. The pupils can have drill in this by having all the towels needed in the school hemmed by them and tapes for hanging them up by be put on carefully.

The herring-bone, catch, and feather and chain stitches must be given this year; and may be practiced on the quilt in strengthening the seams by going over them with these stitches.

The catch stitch will be used in flannel patches and the chain stitch in outlining the names and numbers on the towels and garments made by each child, the chain stitch being a more lasting way of marking garments.

FOURTH YEAR.

This year the pupils are old enough to master the details of measurements in drafting, and the class-room teacher will prove a most valuable assistant to the seamstress in giving the drafting, so that the pupil may be able to take it up in the sewing room and cut out garments readily. So few of the schools have pupils who can do this. Sometimes one or two can. The majority have spent the time in stitching seams, and leave school unable to draft and cut garments that they must make for themselves and the family at home. This must not be. Every girl upon leaving school must be able to cut, fit, and make all garments needed by persons of all ages.

Teach the following stitches:

- Hemstitching.
- Feather stitching.
- Herring-bone stitching.
- Blanket stitching.
- Stockinet darning.
- Cloth darning.
- Hem patch.
- Overhanded patch.
- Flannel patch.
- Gusset.
- Sewing on hooks and eyes.
- Tucking.
- Machine stitching.
- Artistic needlework.

Work to be accomplished:

- Entire outfit of clothing for self, machine made.
- Sample book of stitches learned.
- Compositions on both stitches and garment making. Drafting of patterns for garment work.

Patterns must be drafted in the class room and measurements for all garments must be made, and the number work involved will be
excellent drill in the practical side of numbers, which is too often neglected in the classroom. All theoretical problems must give way to practical ones. The school days are too brief and time too valuable to waste it in theorizing. These Indian children assume the duties

and responsibilities of life early, and must be equipped to fight the battles and cope with civilization everywhere. They must be trained in the value of a dollar and its fractional parts; they must know how to solve all the problems that business presents in everyday life; they must be able to estimate closely the number of yards required for a
dress or other garment, in order that unnecessary waste may be prevented. Likewise as to the amount necessary to carpet a room, to paper a wall, or to curtain a window.

These are the problems they will have to face, and teachers must constantly remember that it is for life that we are fitting these children; therefore it is the problems that life offers that we must give them and teach them how to solve. Emphasize the importance of carefully training every child in the class room in taking the measurements necessary to draft and cut out all garments worn. The seamstress has too much to do in keeping up the work of the school, and this is why so many of our Indian children have not had the opportunity to learn how to cut and fit their own clothes. The Vienna Tailor System, in the simplest way, gives the measurements by square rule for all articles of wearing apparel, and the teacher, by spending a little time and thought on the subject, will be able to present it to the pupils in a series of lessons, so that every girl will go to the teacher of sewing understanding how to use this system and how to cut out the garments she has to make there. This must be taught every day. Present the subject thoroughly and clearly, giving only what can be understood at one lesson. The time devoted to preparation and careful presentation will be well spent.

The pupils must be impressed this year with the importance of care and good taste in sewing, lace-trimmed garments being never permitted excepting in cases where the lace has been knitted or crocheted by the pupil in question. Show the good taste of well-made garments and pretty stitches. Hemstitching must be given this year. This can be taught on the pillowcases for the school, also on the towels. The pupils may always, at the discretion of the teacher, have material of their own to work on in learning the stitches given at the lesson. Many children will not, however, care to provide their own material for this work, and the school, the needs of which are many, will always be grateful for the help that is given in this line by the teacher in making the place more home like and comfortable.

Needlework must be given the children daily, and embroidery, drawn, and other kinds of artistic needlework will wisely be taught. It will be well to remember that to teach embroidery does not necessitate an expensive outlay of silks, linens, or materials. The most artistic and useful embroidery is done in white on white goods. With linen thread the pupils may learn to embroider letters on the school linen. For example, on centerpieces which have been made of table linen a pattern of drawn work may be done around the hem and the initials of the school embroidered in one corner. This forms a most inexpensive and yet highly educative series of lessons in making the home attractive and tasteful and with no outlay of money.

As the teacher realizes that the pupil must be prepared to make a
home in the wilderness, she will teach her to utilize everything at hand and make the home attractive and inviting out of whatever she may have. The expenditure of money for materials to work with is to be discouraged, and the idea is to make the best out of the material in hand.

The greatest stress of the training must be upon the drafting from measurement, and before the year is over the pupils must be able to not only take the measurements, but draft, cut, fit, and make underwear for both boys and girls, and also skirts and aprons.

FIFTH YEAR.

The class-room lessons in drafting and cutting and fitting will be the important feature of the work.

After the experience of last year, the pupils know many of the principles of drafting and are ready to take up the important and more difficult work of learning to draft skirts and waists. This will require careful attention, and lessons must be given slowly and a little at a time. Before the end of the year it is expected of every pupil to draft, cut, and baste a dress for herself. The machine work and the finer parts of finishing may be left to the period of work in the sewing room, but the cutting, fitting, and basting must be done in class.

The work in ornamental needlework, which is the recreation of sewing, and that in knitting, good buttonholes, and neat darning, will be included in the course that the class-room teacher will be expected to give this year in sewing.

Pupils should be encouraged to make handkerchiefs for their own use in this class, and all tendency to display must be discouraged in the selection of material for ornamental needlework.

The teacher must not forget that the greatest stress is to be placed on the drafting and cutting of garments, as the seamstress will expect to receive the pupils from the hands of the class-room teacher fully able to take her directions and able to independently take measurements and cut and draft the patterns she needs in her department.

SIXTH YEAR.

Strengthen those points where the pupils are weak, and give such careful lessons in drafting that by the end of the year the most backward among the pupils will thoroughly understand this most important lesson, which has been so long neglected in our schools.

The review of the work will also be a help to those who have mastered the art. Individual work in sewing should be encouraged. The pupils may often be able to do pieces of work for people, and thus add to their exchequer.

Before the end of the year every pupil in this grade must take the measurements of, draft, cut, fit, and baste up a dress for herself. With this result to be attained, the teacher will see just what lessons will be necessary to give to accomplish it.
SHOEMAKING.

In the shoe shop it is designed to teach the boys to mend and make shoes that they may be able to do this for themselves after they leave school, and, if any desire to follow the trade, to give them an insight into the work and a good foundation upon which to build when they are promoted to a school where the trade can be learned thoroughly.

The shoemaker, with the assistance of a detail of boys, will be expected to keep the pupils of the school supplied with necessary foot wear. All boys must have some experience in the shoe shop and the benefit of this most useful teaching. The shoemaker should sit in a conspicuous place in the shop, that his every movement may be seen by the boys, that they may acquire a workmanlike manner of handling tools, taking stitches, etc. Instruction must be very thorough in mending and patching, half soling (both pegged and sewed) and heel-ing well-worn shoes. A knowledge of mending shoes will be of great value to the pupil, enabling him to keep the foot wear of the family in good condition upon his return home. By being able to put in the proverbial "stitch in time" he will prolong the life of a pair of shoes very considerably.

Work on shoes has a certain fascination for most boys, and the practice is one of the best forms of manual training. The Indian boy possesses great finger skill and does excellent work in this trade, and should seek an opening and go into business for himself after mastering the trade.

Good shoemakers are needed everywhere, and a number of Indian youths are now employed as shoemakers in small towns, doing excellent work, and it is hoped that the number so engaged will steadily increase.

The actual work of repairing his own shoes will tend to cultivate an appreciation of, and a desire for, neatness, developing habits of industry and thrift, and exerting a beneficial influence on the manner in which he performs all other kinds of work. It is important that this trade be taught without the use of complicated machinery, since the boy will have to start a shop on very little capital, while on the ranch or range he will have a limited number of tools with which to work. Styles of shoes change frequently, and for matters of economy in tools it is well to learn to use the iron lap last for half-soling and the coun-ter stand for heeling (straightening heels), and a toe stretcher for tips

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and patches. Some shoemakers in the service use these tools very successfully for this work.

In mending all shoes for the pupils the boy who is desirous of making a specialty of this trade will have ample opportunity to learn general repair work, and the wide experience will fit him to do such work in his own shop. It is good practice to have boys take old shoes apart, learning the names of the parts. Careful work should be exacted in sewing leather, and the details of the trade should be thoroughly taught, step by step, until the boy is able to mend and make a pair of shoes unaided.

In localities where rubber boots are needed, teach the boys to repair them with rubber and cement, also how to put on leather half soles when the original rubber sole has worn out. In cold sections where heavy leather mittens are used in winter, practice should be given the boys in making them complete, also in facing and repairing them.

The work must be given progressively, first teaching to make waxed threads, then the proper position for stitching, the use of the awl, the proper method of drawing through the waxed ends, much practice in stitching evenly and making a straight seam; also making the different stitches, as plain, overcast, whip, etc. Teach the use of the sewing machine in stitching leather and general repair work.

Pupils will come to the shop this year with a general idea of the work on stitches by hand and with the machine, and it will be good practice to stitch ripped shoes and do general repair work at first in
apart and putting them together again will be useful to the pupil at this stage of his instruction, reviewing the names of the parts and doing the work alone. Pupils must be given much practice in cutting lifts and soles this year and in using the knife properly, rounding up sole with knife and rasp, finishing edge, sandpapering, buffing, and lasting; also in sewing on toe caps neatly, putting on middle soles, lasting toe caps and to last prepared uppers, put on half soles, "turned" soles, half-sole welt shoes, heeling, also in taking measurements and making a shoe complete.

Talks must be frequently given on leather (learning the best parts of a skin), thread, and other shoe materials.

THIRD YEAR.

Boys who have had two years' instruction in the shoe shop will be sufficiently advanced to assist the shoemaker in instructing new pupils in the stitches, etc., and much independent work will be expected the third year, and tests of their ability given by having them make lined shoes for men and women complete, from measurements they themselves have taken.

In review, talks on materials and tools must be given, being sure that pupils understand fully the names and uses of the different tools, and the details of the work in shoemaking. It will be an excellent plan to have pupils prepare compositions from time to time while learning shoemaking, giving the work, step by step, in making and mending shoes. Talks must also be given at length, and frequently, on the processes through which hides pass before they become leather, the Indian ways of tanning, present methods, materials used, how obtained, the different grades and uses of leather, relative texture, the best for wear, and the styles of shoes in relation to durability and comfort. Making shoes from measurements, selecting stock, developing patterns, and on estimates.

Pupils desiring further instruction must go to one of the large non-reservation schools, where they will enjoy every opportunity for learning the trade.

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SPELLING.

FIRST YEAR.

Spelling is best taught by having the pupils master the words they meet with in their other studies and in their everyday life. When a new word is used in the reading lesson, the pupils obtain a correct idea of its meaning, its relation to other words, and its proper use, and if proper advantage is taken of the opportunity to impress upon them the correct spelling, this, with the repeated use they make of it during the preparation and recitation of the lesson, will create in their minds such a distinct mental picture of the word that it is not likely to be forgotten. The mere effort to stamp it upon the memory while only half understanding its meaning and use will not prove nearly so effective, and at the same time is a more difficult and uninteresting task to the student. The average person, in his daily life, gets unconsciously the greater part of his ability in spelling through this natural method, especially if he has much writing to do where he is obliged to use words in their proper relations. The teacher will, therefore, give special attention to this method of teaching spelling to her Indian pupils, and in the lower grades it will be used exclusively.

Hence, in this first year, the teaching of spelling will be altogether in connection with the work in reading, in addition to learning to spell a few names of familiar objects which the child sees every day. Beginning with the first simple words that are learned as a part of the reading lessons, have the child write and rewrite each word until he is thoroughly familiar with it. As the work progresses new words will be used every day, and special attention must be given to them until their spelling, as well as their meaning and pronunciation, becomes so thoroughly a part of the child’s knowledge that he can recall it without effort. The important point to bear in mind is thoroughness. Never leave a word unmastered, and thus a good foundation will be laid for future work, and the task of learning to spell in the higher grades will be rendered much less difficult.

SECOND YEAR.

Review the first year’s work and continue in accordance with the directions given for that year. Each day study the new words occurring in the reading and other lessons, and make them the subject of
the spelling lesson. The teacher will be able to pick out the words that the pupils are most likely to forget, and she should keep a list of these. Then from time to time she will give them to the pupils as a review exercise, making the class write the words from dictation, and if it is found that the spelling of any has been forgotten she should have them written on the board and relearned by the students.

Write a selected list of words from the reading lesson on the board and have the pupils copy them. Afterwards give these words to the pupils to write from dictation. After the written exercise have some pupil spell them orally, and give careful attention to the pronunciation.

Have learned, as the class progresses, such of the elementary rules of spelling as will be of assistance to them.

Teach the spelling of the simpler names of familiar objects around the school and the grounds, the articles and implements in the shops, the names of vegetables, grains, and fruits raised, and especially the vegetables raised in the child's garden. Give also the names of the days of the week, the months of the year, and the seasons, by having them written where the children will see them often and by having them write and use them frequently.

**THIRD YEAR.**

Give special attention to new words occurring in the lessons. Write upon the board a list of words selected from the reading lesson, have them copied by the pupils, and later written from dictation and pronounced correctly. Correlate with the work in English by having the pupils use these words in original sentences, both oral and written. See that capital letters and periods are used in their proper places.

The specially difficult words should be written upon the board and the attention of the students frequently called to them, so that they may be accustomed to their appearance. Use them occasionally as a review drill.

Do not restrict the words studied to those occurring in the reading lesson, but include also those used in the daily work in language, geography, nature study, etc., for it is the aim to have the child master the spelling, meaning, and pronunciation of every word he has occasion to use.

As in the grade preceding, use as material for the drill in spelling the names of the various articles connected with the school and the farm, such as the names of the different fields and divisions of the farm and of the school grounds, the names of the grains, vegetables, and fruits, the trees of the neighborhood, the products of the child's garden and the school garden, the implements used in the garden and on the farm, the fertilizers, the domestic animals owned by the school, review. Pupils will make a shoe complete this year, fitting the uppers, sewing welt to uppers and sole to welt. Practice in taking old shoes
the birds of the neighborhood, the things made in the various industrial departments, such as the carpenter, blacksmith, and shoe shops, the sewing room, kitchen, etc.

Before closing the third year, give a review of everything previously done.

FOURTH YEAR.

Continue the careful study of new words in the reading and other lessons, as in the grades preceding. The vocabulary of the student should keep pace with his knowledge. Advance slowly and give frequent review. Teach the meaning of the diacritical marks, and drill the pupils in pronunciation by these means. To do this readily will require considerable practice.

All the new words learned, both from the reading and other lessons, must be used in original sentences, thus teaching more effectively their meaning and relation to other words and objects.

The lessons in the spelling of words associated with the daily life of the children and the work of the institution should be continued. The progress of the pupils in the several departments will have made necessary the use of many new words, which they must learn to spell and pronounce correctly.

FIFTH YEAR.

Review the work of the third and fourth years.

In recitations it is better to use both writing from dictation and oral spelling, so that the pronunciation may not be neglected. Do not give lessons of too great length; thoroughness in the study of spelling is an essential.

Teach carefully the pronunciation of words. Continue the study of diacritical markings and pronunciation by their use.

By the practice of taking words used in other studies and in the industrial departments as material for the spelling lessons this branch may be made to correlate with them to very great advantage. Moreover, the constant advance of the students in other branches will render the keeping up of this practice further desirable and necessary in order that they may retain their mastery over their constantly increasing vocabulary.

SIXTH YEAR.

Review the work of the fourth and fifth years.

Give drill in the division of words, and pronunciation by syllables. Impress upon the students that in writing, a syllable must never be divided at the end of a line; it should be written in the next. Hence, one-syllable words can never be divided.
A list of misspelled words will be kept and at convenient times made a lesson for study and recitation. Specially difficult words, and those usually misspelled, should be kept on the board until the pupils have thoroughly mastered them. Ability to spell words commonly misspelled is in most cases a sign of a good speller. After the words have been removed from the board they should occasionally be given as part of the lesson, to determine if the pupils' mastery of them is permanent.

A very profitable way of conducting recitations of lessons from the spelling book is to compose sentences in which the words of the lesson, and particularly the difficult words, are used, and then have the class write them from dictation. This method can be used frequently.

Teach the use of the dictionary. Whenever a word occurs in the classes, the meaning or pronunciation of which is unknown, send the pupil to the dictionary to ascertain it for the benefit of the class.

Teach the rules for using capital letters, those for punctuation, and also those for forming the plurals of words.

Scrutinize all the written work of the pupils, and whenever words are misspelled have the pupil study them until they are mastered. By refusing to permit errors of this kind to go uncorrected, habits of carelessness will be prevented and that thoroughness secured that is always the test of a good speller.

Follow suggestions of previous grades.
TAILORING.

The tailor shop must make all uniforms and other clothing needed for the boys, keep all suits in good repair, and furnish strong, durable trousers and jackets for small boys. A number of boys will be detailed to the tailor to assist him in doing the work and to be instructed in the trade. It is not the intention to graduate artists in the work so much as it is to give general instruction to all boys in handling the needle and repairing old garments and making new ones, that upon their return to their homes they may be able to keep their clothing in good repair, and, when necessary, to make their own apparel.

The tailor needs efficient helpers, and some pupils who have a knowledge of the work should be constantly on his detail, that he may economize time by putting "raw recruits" under the surveillance of those having a knowledge of the trade, to learn the stitches and rudiments of the work.

The shop detail should have four grades of workers; efficient apprentices, apprentices, helpers, and ungraded workers. Boys having had a three years' course of instruction in the shop, and who are able to make citizens' clothes and uniforms, would be considered efficient apprentices. Apprentices are those who can make pants and have begun on coats. Helpers have mastered the stitches, both on the machine and by hand, and have worked on pants, while ungraded boys are those beginning the trade.

To a limited number of boys who show special aptitude for the work the tailor is expected to give each year careful instruction in taking measurements, drafting patterns, cutting and fitting, making, pressing, and finishing garments. The work should be progressive and thorough, and given step by step.

**FIRST YEAR.**

It is impossible to give a rule as to the proper time to begin instructions in tailoring, but a boy should not be put at this work under 12 years of age.

The first step to be taken is to give the pupils practice in stitching, in order to accustom them to the use of the needle and thread, beginning with the running stitch and the backstitch. After they have mastered these teach them the names of the other stitches and give
them practice in the less difficult ones. Keep a record of the work each boy does in the shop.

In teaching the use of the machine do not at first allow the boys to sew on it, but only instruct them and give them practice in how to run it. Let them use it without a needle until they become thoroughly familiar with it, otherwise there will be simply a waste of needles, as the boys break them very frequently at first. In teaching sewing with the machine insist upon the boy learning to sew straight seams. Use a gauge to give him an idea of the size of the seam. When the pupils have acquired skill in this work they must use the machine in making pants, and in the latter part of the course they should be taught to use it in making pockets, buttonholes, and, in fact, all kinds of work with which it is desirable to use a machine.

Teach that quality, not quantity, is the most desirable aim, and therefore rapid sewing on the machine at the expense of careful work should not be permitted.

Give the ungraded boys repair work and pressing, and follow with instruction in the making of buttonholes, and drill the children in this work until they can make them fairly well. This should not take longer than four or five days with the ordinary boy. After this is done take up pockets, teaching how to make the different kinds suited to various garments. As before, keep at this work until the pupils have attained a fair degree of skill. Much practice may be had in this direction by having the boys mend torn or worn pockets on their own clothes, and when necessary put in new ones. Or the clothes of other students outside of the class may need repairing of this sort, and the seamstress will be very grateful for assistance rendered in this way. This kind of work will provide a valuable lesson for the boys in thrift and economy.

The next step will be learning how to make half a pair of pants. This will be a little more difficult and will take some time. Have the pupils work carefully rather than rapidly. Basting must be taught from the beginning. Good work can not be done without it. In the sewing and putting on of pockets basting is as necessary as it is in the making of the various parts of the pants, coat, and vest. The work of binding the buttons of the trousers must be done well and carefully. When this is finished and the pockets are in have the pupils make the other half of the pants, and teach them how to put the two parts together. Then comes sewing on the buttons and putting on the strap. Those boys who wear long trousers may make the first pair for themselves, and the knowledge that they are making them for their own wear will stimulate their interest, make them more particular and careful, and, by creating a pride in their ability to clothe themselves, render the work of much more value to them.
SECOND YEAR.

The boy who has completed the first year's work in the shop is capable of being advanced to the grade of helper. He in turn helps boys beginning the trade.

The work this year will be on coats.

Aiding the boys who are just beginning and helping them master the work of the year previous will impress it more firmly and clearly upon the minds of the helpers or second-year pupils and be mutually beneficial.

Practice in pressing must be given the second-year pupils, as this is one of the most important lessons to be learned in the trade. By actual work, teach the cleaning of clothes, the various ways of removing stains, dirt, dust, etc. Material for practice will not be wanting, as the matron or disciplinarian will always have an abundance of soiled clothes, and will be grateful for the assistance of the pupils in cleaning them. Every boy in the class must be required to keep his clothes well pressed and scrupulously clean, thus training them in habits of cleanliness and neatness, and setting a wholesome example to the other pupils.

Teach the art of taking measurements and drafting patterns for pants. Let each boy make an entire pair of pants for himself from measure, doing the whole work alone from the drafting to the pressing. This will give him self-confidence and provide practice in drafting, cutting, fitting, sewing, etc.

Careful attention must be given to making vests, making welt, patch, and faced pockets, putting in stiffening, putting on collar, etc. Special attention will also be given to sponging cloth.

Much practice must be given in inserting round, square, and triangular pockets to match stripes, checks, etc.; also in patching, darning, and splicing.

THIRD YEAR.

A boy who has had the work laid down for the first and second years in the tailor shop may be considered an efficient apprentice.

The taking of measurements, the drafting and cutting of patterns for coats, coat making, and general work will occupy the first three months of this year.

Special instruction will be given the boys in cutting by patterns and in cutting trimmings.

Teach how to take correct measures. The tailor should take a boy's measure and allow the apprentice to do the same. If their measures do not agree the first time, let them be taken over again until they do. Teach him next the different scales and measures from the square. Give him drafting for a uniform coat, and assign two lessons per week of one or two hours' duration until he is able to draft without help.
An easy system simplifies matters to a great extent. Too many lines and angles are often discouraging. Teach the straight lines first, and practice a great deal on the curves. For the first few lessons do not cut out the drafts, but after a little practice a boy should cut quite skillfully. A boy should show marked improvement with each succeeding lesson, if he wishes to be a tailor, and soon should be able to draft without further instruction.

During this year practical talks will be given from time to time on estimating materials and cost of suits, the study of fabrics, and the purchase of goods.

Throughout the course the tailor will give attention to the position of the workman, and the proper method of threading the needle should be emphasized from the first.

Test the student's executive ability, and give special instruction in the details of running a successful business and in business etiquette.

Boys showing special proficiency in the work of tailoring should be sent to the larger schools, where they will have opportunities to learn the trade thoroughly.
TEACHERS' READING COURSE.

Education is given a man to develop character and to enable him to make a living. The white man is educated to prepare him to take a place prepared for him by his father, while the Indian must make a place for himself in life, and by his determination to succeed and ability to do the work he has attempted as well as possible, to demand respect and consideration; and he will receive that recognition to which his merits entitle him as a man and a citizen, but ability to compete with his fellow-men can not be forced upon him and will come to him, like to all races, only through the law of evolution. The process is gradual, beginning at the bottom, but with a sure foundation to build upon he will gradually work up to the highest attainment.

Educate the child to fit him to cope with the difficulties that will surround him in his environment; hence the necessity for directing the education of Indian children so that the greatest proportion of the mental strength of the masses will be brought to bear upon the practical, everyday affairs of life at the home and upon what they will do in their respective communities, enabling them to see the opportunities in each locality.

All races need manual training, because a living is made by the masses by some form of manual exertion, and the need of the hour is to work with system, intelligence, and science. Manual training concentrates the forces of the brain, hand, and eye to accomplish a set task, and the Indian stands in great need of such training as a means of race development, since as a race he has but little experience in handling affairs, and his training must be that which will develop practical judgment and executive force.

Industrial education carries with it as a corollary literary and moral teaching and practice. Labor inculcates simple tastes and habits of work, out of which will gradually grow a love of work, the opportunity to practice economy, pay all debts, and own property, putting by each month a part of the earnings. The man who leads this life will be esteemed a useful citizen and has laid the foundation upon which future generations may build to heights in the arts and sciences.

Study the environment of the children and the outlook for them on leaving school. Study each child individually and prepare him as nearly as possible for his career, whether housekeeper or farmer or herder or lumberman, or whatever calling in life his may be, that he
may go into his work with a knowledge of its possibilities and the ability to make it lucrative. The instruction in the class room will include agriculture, nature study, cooking, carpentry, practical problems in handling money and facing the duties of life, training the pupil to be resourceful, ready, and accurate, and to be many-sided. In the departments where the industrial work of the school is carried on, give pupils such careful supervision and such a wide experience in doing things and in depending upon themselves that they can not fail to go home enthusiastic and prepared to make their way in life and become valuable citizens in their respective communities.

The teachers in every school are expected to read and study those works which have been referred to under the various heads of this course, and such other publications as they may have access to. In the library of each school will be found many such books. Numerous magazines are published which will also be found of great assistance, such, for example, as the journals on farming, dairying, poultry raising, etc. Such a course in reading is necessary in order to enable the teacher to carry on the work in the class room as outlined in this course of study and to advance the pupils as rapidly as possible in sewing, gardening, cooking, reading, etc., and in order to maintain the standard of excellence required in teachers of Indian schools.
Upholstering should be taught every pupil in the school to enable them to add to the comforts of their homes. The boy or girl having a knowledge of this work will be enabled to make good mattresses for beds, attractive and comfortable seats out of old boxes, nail kegs, and barrels. Boxes may be made into sleepy hollows or chairs by completely covering with upholstery; or divans and couches out of two boxes placed together. Thus the home may be furnished in an attractive manner at small expense. They will be able to neatly repair furniture that is worn and to reject the contents of uncomfortable mattresses, washing and refilling the tick, and sewing it into shape again.

To make a mattress complete, first cut the tick to measurement, allowing one inch to the foot larger than the bed. This will be taken up in the tufting. Sew up the tick, leaving an opening of 16 inches. If it is to have a cotton top, leave opening on side; every other mattress may be filled from the end. Then make the boxed edge by turning the cloth in and sewing both edges on the right side, or a braided edge by sewing on the right side and then binding with braid. Laying out is an important part of the work. Lay off with rule and pencil. Mark as in fig. 1 for biscuit tufting, and as in fig. 2 for diamond tufting:

Tack the tick on a table half way its length, in order that the end may be easily reached. Begin filling at the end, using hay, excelsior, husk, moss, etc.; fill until it is full; sew up the opening with blind stitches. Next put in the stitching around the four sides, stitches
not more than 4 inches apart. Use a mattress needle and twine; start in the side, bringing the needle out on the upper side of the mattress about 8 or 10 inches from the edge. Draw the needle through, putting the point in again just where the eye came out, bringing it out 4 inches from the former stitch on the side. Continue until the four sides are stitched. This should be one-third the distance from the top, and a second row of stitching, stitches to be exactly under upper row, one-third from bottom of mattress, leaving one-third space between rows of stitching. Then the mattress is ready to be tied. Start the tying 6 inches from the edge and the same distance from the end; divide the remaining space into spaces not more than 1 foot long. Nine by 13 inches is the usual size (9 inches long, 13 inches wide). Make a slipknot, drawing it down tightly on top of the leather tuft (a bunch of cotton or a small roll of denim may be used to make tufts if preferred). Stick the needle through the mattress and back, placing a tuft under the loop, then drawing the cord down with a slipknot on top the second tuft with a half hitch on top the slipknot, making a strong knot; then cut off the ends close. The mattress may be stitched or tied, going over it a second time to put in the tufts. It is best to do all stitching first then put in tufts and tie.

It will be of practical value to students to know how to make cushions of various shapes for furniture, vehicles, etc., and these can be very easily made by first making a slip cover, the upper or top part being one-third larger than the under. The bottoms of cushions should be made stiff by pasting burlap or bagging on the inside of
bottom piece. Lay out with a ruler and pencil for diamond or biscuit tufting. Sew and then fill, shifting the filling where it is needed to fill out the corners and give the cushion a smooth appearance, using a crescent needle for stitching edges on cushions when making a roll edge only.

Talks must be given on materials that are most conveniently obtained for filling, as excelsior, hemp, tow, Japanese fiber, moss, or hair of different grades, and also on the relative durability of coverings. In a climate where moths are apt to get into furniture, use cottons, but woolens retain the color better. Talk also on tools, their names and uses; on twines, their sizes and names, of what they are made and where purchased, and on springs and burlaps. Instruction in setting and tying springs, in roll making, webbing, sewing on the springs and drawing on covers will be given by actually doing the work. Strips of denim will do just as well for webbing, and these should be laid across first in upholstering a frame. If a box, to be upholstered as a seat, is to be used for a cupboard, put a brace 2 inches wide across the top of front of opening to prevent box front sagging and to give purchase for nailing.

1. Each worker should be supplied with a claw hammer (tack claw hammer) and a box, or some frame to put springs on.
2. A ball of two-ply twine to tie springs after said springs have been fastened to the box with small staples.
3. Mattress twine for tying reed or wire, stitching roll, etc.
4. Chair springs to cover frame or box. No special number are needed, but judgment should be used in placing them so as to insure a durable, comfortable seat.
5. Springs should be placed in rows of threes and twos, alternately. Each row is tied with a string lengthwise, sidewise, and diagonal, going first under the string, then over the string, then under, then over the twine to make a tie, tacking each end of the string to the box. A wire is then tied around the top of the springs, all around the outer edge of the top, making it tight to the side of the box, and fastening it securely to every spring it touches with stitching twine.

Cover the top of the seat, the springs, with a large piece of burlap, stitching it securely all around the edge to the wire that outlines the top of the seat, drawing the burlap down then and tacking it to the sides of the box.

6. Staples to fasten springs on the top of the box.

To cover a small box, 13 chair springs are fastened on a box with staples. The springs must be arranged in the order of three on the end, then two, three again in the middle, two again, and then three on the end.

Tie these springs with two-ply spring twine at right angles, then diagonally each way, fastening the ends of the twine to the sides of
the box with tacks. Fasten the end of a wire into the box and pass the wire around the outer edge of the springs, fastening it to the springs at point of contact with stitching twine.

Cut a piece of burlap the required size, cover the top of the springs with it, sewing it to the wire (reed) with stitching twine, using a crescent needle. Tack the lower edges of the burlap to the box; fasten the springs to the said burlap in many places.

Mark off a rectangle on a second piece of burlap, 3½ inches from the edge, and lay over the springs. Sew three sides of this rectangle, leaving one side open, which is now filled with hair, grass, corn shucks, moss, etc. Sew the fourth side of the rectangle. Make a roll by putting a roll of excelsior in as tightly as possible, basting it down with skewers (long upholsterers' pins). It is then stitched down just below the reed with the combination stitch (two stitches and a back stitch). While stitching this roll just below the reed with the combination stitch, great care must be taken to keep the corners square, after which fill this space with hair, etc. Stitch the roll with a continuous stitch, advancing three-fourths of an inch each stitch, bringing the needle out at the entrance of the last stitch, using the 3-inch crescent needle. In making a roll, if it inclines to hang over beyond the box, take the stitch high on the outside and lower on the inside. If the stitch inclines the other way, take the stitch high on the inside and low on the outside. Then such a seat is ready for the outer covering. The top may be covered, fastening the ends of the cover securely to the sides of the box with tacks, then a curtain or valance may be put on pleated or gathered and finished at the top with fancy braid or brass tacks, or it may be gathered with a heading and blind stitched to the top cover, or the sides may be covered plain, using brass tacks to finish all edges.

Another way to make the top of such a seat is to lay a second piece of burlap on top of the springs, marking off 3½ inches back from the edge, stitching around on the line with a crescent needle on three sides and then filling the center with excelsior, etc. Then stitch the fourth side and finish around the reed (or edge) with a roll made of excelsior, hair, etc., fastening said filling to the reed under the outside edge and over the reed with skewers, then bring the burlap over and stitch the first piece under the reed with a crescent needle. Seats having a roll may be finished with a puff.

The cover for such a seat may be put on plain across the top; then a puff should be put on so as to cover the roll, blind tacking said puff on the top side of the box to the edge of the plain cover, stitching the other edge carefully under the roll. Finish with a cord to hide the stitching.

To make a stuffed or padded seat for chair or a box on which springs have been fastened, cover springs smooth with burlap, then take
dimensions of chair and cut another piece of burlap the size of chair, allowing 2 inches on each side for hemming and 3 on each end to lap over top and bottom of frame. Eight inches from each end begin, dividing the space in four blocks, each 5 inches by 6½. This forms the biscuit shape. Then draw lines crossways both ways, making the diamond shape. Then cut the top of the muslin, allowing one-third more for the top than the bottom, and letting each measurement be one-third larger than the lower. Fill with hair and tie, making the double loop. After having filled, fasten to the frame, putting on outside cover with buttons, beginning with center row, letting all tucks fold toward the bottom.

The instruction given in the course in basketry will form the first lessons in chair caning and will lead up to work with splints, rushes, cat-tails, the bark of trees, etc. It is often well to fill the cane seats with excelsior between the sides just before the weaving is finished. The design is to be woven and the chair finished out at the corners, which is done with the cane that makes the diagonal lines, then follows the beading, using coarse cane around the edges, then tying off, fastening ends underneath.

An excellent book in the hands of the teacher is Complete Upholsterer, which may be obtained at any of the leading book houses.
WRITING.

FIRST YEAR.

The first thing to be impressed in this subject is the importance of a correct position at the desk and the manner of holding the hand and the pen while writing. A twisted condition of the body, with head and shoulders down, must not be tolerated. To obtain the correct position for the hand place some small object, such as a coin, a small piece of cardboard, wood, chalk, etc., between the knuckles of the first and second fingers, and hold the hand in such a manner that the object will not slide off. The fingers should grasp the pen with sufficient pressure to hold it firmly, but must never squeeze or clutch it, as this tires the hand and tends to writer's cramp. The wrist must always be free from the desk.

A muscular or forearm movement should be introduced, which, with the natural finger movement, will speedily form a combination of the two. Pencils only will be used to begin with.

Give the child at first the simple words used in his early reading lessons, having him first write them on the board from the word written first by the teacher, and then have him copy them again at his desk. Follow this with practice on little sentences, also taken from the reading lesson. Thus the writing and reading lessons will assist each other.

Have the child do much of his work upon the blackboard.

Use large characters at first, letters round and of uniform size. The strokes of the letters must always be parallel; that is, the downstrokes must all be vertical. This is a point to be kept in mind by the teacher in every year.

Give the pupils drill in using both hands by having them practice at making large ovals upon the blackboard, using both hands at the same time. This will develop both sides of the body equally and prevent the left arm and hand from becoming much weaker than the right. This exercise may be used with other strokes than the circle and oval. It should be indulged in quite frequently and carried through the third year at least.

In all writing, beginning the first year, attention must be given to capitalization and punctuation. Accustom the child to the use of capitals in their proper places from the first.
SECOND YEAR.

Continue on same lines as in first year, still using pencil. Write the reading lessons for practice. Toward the end of the year drill may be given in writing from dictation.

The letters may now be written a little smaller. Insist upon neatness in all practice and other writing, and permit no carelessness. Teach the proper formation of figures.

The teacher's writing must be done as well and as carefully as possible, for the pupil will imitate her to a degree unconsciously.

Give much practice on the blackboard as before, and continue the work of writing with both hands.

Watch the position of the children at the desks while writing. Never allow the face to be held so close to the paper that the nose nearly touches it. This is a habit many children contract early in life, and too much care can not be exercised in having all children assume a comfortable and proper position while writing. A great deal of nearsightedness is caused by pupils early contracting the habit of holding the face close to the paper.

THIRD YEAR.

Pens may now be used and copy books employed, but work on practice paper must also be continued. For this purpose sentences may be taken from the reading lesson, and should be copied over and over again.

Begin this year to teach the use of the forearm movement. See that the wrist is kept free from the desk and an object on the hand as described in the work for the first year, to secure and preserve the proper position. Practice the arm movements with the large O and other exercises given in the copy books. Continue, also, the exercises at the blackboard, using both hands simultaneously.

Give the children simple practice in letter writing. Beginning this year, every child must be made to write to his parents or guardians at least once a month, which will of itself be of immense benefit.

See that all pens are cleaned after using and that writing material is kept in a neat condition. Furnish each child with a blotter. It will be a good plan to place the ink bottle on a blotter, or if ink wells are used, place a blotter around the well. This will help to keep the desk neat.

FOURTH YEAR.

By this time the pupil will do much writing daily in his school work, and he must be cautioned against becoming careless. Attention to the everyday miscellaneous writing of the student is more important even than to the regular writing lesson.
Give further practice in the use of the muscular movement in combination with the finger movement. The union of both gives best results. Make free use of practice paper before beginning in the copy book. Cultivate a free, ready gliding over the paper and a bold round hand. Give attention to the position habitually maintained by the pupils at their desks.

Use copy books regularly, but do not give a very long period to the writing lessons.

Writing on the blackboard is of very great importance, and each pupil should be given as much of this practice as possible. Here the merits and imperfections of the individual student are exhibited before the whole school, and a great stimulus to better and more earnest work is provided. Occasionally exhibit specimens of writing on the board and have the pupils criticise it, showing wherein it is faulty or excellent.

See that the pupils keep up their home letter writing.

FIFTH YEAR.

Continue practice in the combined muscular and finger movement. Have the pupils prepare specimens of their writing for exhibition purposes and to show their parents. For this purpose use a selected article and limit the time for writing it, that speed may be acquired.

Give further instruction in letter writing, the different parts into which a letter is divided, and the best way of writing them. Show the difference between letters of business and letters of friendship, and give practice in writing both. Give a little talk on letter writing. Have the pupils write specimen letters, address them properly, and hand to the teacher.

Inspect upon neatness and care in the writing of the various compositions and other written work which the pupils will be called upon to do in the course of the school work. See that the proper position is preserved, both of body and hand.

SIXTH YEAR.

Teach simple business forms, such as must be used in everyday life, and have the pupils practice writing them.

In writing compositions, letters, etc., see that a generous margin is left on both sides of the paper, at least three-quarters of an inch. Also give attention to the punctuation, capitalization, and paragraphing. Persons who can do these things correctly are exceedingly rare, and there is no other way to acquire this ability but by actual practice in everyday writing. This work will incidentally be of very much assistance in the acquirement of grammar.
Continue the work upon the blackboard, and daily writing lessons in copy books, and the writing drills in movement. See that the monthly letter to parents or guardians is not neglected.

SEVENTH YEAR.

Give some drills in writing by time, using the combined finger-forearm movement, but do not hurry students beyond their ability to write smoothly and legibly.

Writing will now be chiefly in connection with the lessons, and this is ordinarily the time when the legibility of students' handwriting decreases, on account of the large amount of writing required and the hurry to complete it, and the teacher must therefore keep a careful supervision over the pupils' writing. If the pupils' have acquired an easy, rapid movement, there will be little danger from this source.

Teach the forms and give practice in writing bills, receipts, promissory notes, checks, etc.
CONCLUSION.

It is hoped that the teachers of the different departments of the schools for the education of Indian youth will cooperate earnestly with the office in endeavoring to give pupils a practical education embracing the subjects outlined in this course, and it is earnestly desired that all teachers shall give the pupils under their charge as much work as is laid down here each year, and as much more as they can possibly find time for; remembering that earnest and persistent endeavor will bring success and accomplish what we are so anxious to achieve—placing the Indian in a position to help himself, making of him an upright, self-supporting, Christian citizen.

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