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LESSONS IN FOURTH YEAR GEOGRAPHY

Topic: THE WORK OF WATER.

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Critic Teacher
in
The Intermediate Grades

Since the study of geography is begun in the fourth year, the teacher of that grade has the privilege of laying her own foundation. It adds much to her enjoyment of the work and to its efficiency to see that the kind of work planned for the children of the state to do in their introduction to this subject gives the sort of training and understanding that must be had if they are to get anything like a breadth of grasp in their mature study. When she looks over the work of the whole course in the subject, as the teacher of beginners should always do, she sees her field in relation to this whole and its truly fundamental nature becomes apparent.

The main purpose of the beginning work in geography, as it is stated by the author of our Illinois Course of Study, is to

train the pupil in observation of the every-day physical phenomena of his immediate environment. In this training, the author says further, one purpose the teacher should have constantly in mind is to "invite attention at every step to the causal relation in things, asking the question *Why?* and finding the answer in the phenomena."

The study of the work done by water gives an unusually good opportunity to see marked growth in the pupils in these two ways. The phenomena are within reach and often close at hand; they are ever changing, always interesting; while they may not be of a kind that gains the child's natural interest in a way that will be profitable for our ends, they do when presented in a stimulating manner, appeal to a child's freshness of mind and sharpness of eye.

When the child once realizes that the stream he crosses every day or in which he goes wading and fishing, has a life of its own, does things, and is itself subject to changing conditions, it will take on for him a new and lively interest. He will come really to notice things which before he had passed by every day without seeing. This observation will extend to similar and related things and he will come finally to inquire into the *why* and the *wherefore* and will seek to find an answer in the phenomena themselves.

Probably the idea that water is an agency in the building up, tearing down, or modifying of land forms has never struck the pupil in the fourth grade. To be sure, in his play along streams and by the roadside after a rain, he may have noticed the taking up of soil particles in one place and the laying them down in another. Perhaps he has noticed the changed appearance of the little slope after the transportation. He may have watched the formation of a miniature river system. Possibly he has looked more closely and has seen why the streams take the courses they do and what different results are seen from the different rates of flowing. Whether the child has seen any or all of these things and others of like

nature, by himself, depends upon whether he is naturally of an observing and inquiring turn of mind. It appears that most children who enter the fourth grade have not had clear perceptions that can be counted on as a basis for study of this subject. The only thing to do, then, is to see that they get this basis. The only way to do this satisfactorily, it seems to me, is to give a series of out-of-door lessons.

In a school where the teacher has charge of but one grade, this is easily managed, though even in that case, if school hours are taken, the regular programme must be set aside. In a school where the teacher has charge of several grades, it may be necessary to take time after school or on Saturdays. We have often gone after school in preference to taking time earlier in the day. This gave us the two hours and a half before supper to visit a stream a mile away. A Saturday lesson is practicable and does away with the hurry that a short lesson makes necessary. A light lunch should be taken in either case, as without it children are likely to grow tired on a long tramp.

Out of door lessons with the unusual conditions they involve present peculiar difficulties in the way of class work. The danger, of course, is that such a lesson may become altogether a picnic. However, if due preparation is made, it can be business-like and successful. An outdoor lesson is the last kind of lesson in which the teacher can afford to depend upon the inspiration of the moment. Before starting out she should know clearly what she wishes to accomplish; she should have carefully looked over the ground beforehand to see what questions it presents which it is possible for these children to comprehend and find the answers to. She should also give the pupils a talk before starting out, telling them the purpose of the trip, what their conduct is to be on the way, and that a quick response and class room attention are demanded when a place is reached where study begins. One or two questions are enough to give out at a time, then the

class will come together again promptly to talk these over and receive further direction. It is altogether desirable that these requirements be understood by the class before they start.

The work directly preliminary to the topic for this series of lessons is taken up in the first month. The pupils have noted what becomes of the rain that falls—some of it evaporates, some sinks into the ground, some flows off into streams. The study of the first two processes has been taken up somewhat in detail and the third remains for further study.

With regard to order of procedure in our field trip, we will let expediency and conveniences largely determine that; we can attend to the organization of subject-matter later in the class room.

Since conditions around Charleston, which we have studied, are typical of those in this part of the state, I will speak of some of the field study my fourth grade has done.

We usually go first to a little valley about a mile to the west, called Happy Valley. A little this side of the valley we go into a pasture where there is a good place to note direction of slope and consequent flowing of water. When we get up on the divide, the children are asked which way the land slopes where they are standing. There is usually a difference of opinion. Some child is sent a few rods to the south. Which way does the land slope where he stands? Then other slopes are noted in the same way. Which way would water flow falling at such a point? In a heavy rain, what would become of the water which falls where we stand? Some of it would flow to the south, some to the north, some to the west. As we look across the field and see places that appear to be level, we may know that if we were to look closely we should find that the surface is really not entirely level but is made up of slopes. (The children here as elsewhere in this work should be asked what they see and not be told what they see.)

Where we are we have noted marked slopes and have seen that some of the water flows one way and some another. We call such a place a *divide.* Do you see why? What is a divide, then? Do you think of any others you have seen? Where? Another name for the dividing line of waters flowing into two different streams is *watershed.* Does this seem to you a good name? Why?

In looking over the country from this point we notice the general direction of slopes. These slopes all appear to be gentle. Have you seen slopes different from this? Where? Describe them. Such steep slopes are called *abrupt* slopes. Later we shall see the difference in the work done by water on these different kinds of slopes.

Going on to the west, we come to the *source* of a small stream, the general direction of which is north. The water is seeping out from the side of the hill.

We go down this stream and notice its crooked course. Why does the stream take the course it does? The slope for the most part determines this. What causes this bend in the stream? Perhaps there was less resistance in that direction; the soil may have been softer or looser; at another place some tree or stone may have turned it aside so. Farther down the curves become more pronounced and we have a *meandering* stream.

Can you tell at this point which way the water flows? Besides the direction of the *current* and the slope of the land, the appearance of the banks gives us evidence. One side is a gentle, grassy slope. The opposite side is nearly vertical, without grass and somewhat cut under. How has this difference come about? Notice the overhanging top of the bank on this side. Why is this? We see the mass of tangled roots of grasses near the top and they help us to answer. On one curve we see the huge roots of a tree exposed. The tree occupies a point of land which is not cut back nearly so far as in the corresponding place above. There are several

such places where the retarding effect of roots upon the wearing away of soil particles by water can be seen. What do these roots do to prevent this wear? Look at them closely—their number, form, and position.

How far below the level of the general surface is the bottom of this bed? What has worn it out so? Has water, then, such wearing power as this? What evidences of this have you seen elsewhere? If you wish to see just how this is done, a roadside after a rain will give you a good oportunity. Watch the gradual wearing away of the particles of soil, the taking of these up by the current, their suspension in the water and movements against each other, the rolling of tiny pieces of gravel or sand along the stream, their action on each other and on the botton of the stream bed, the dropping of transported materials where the slope lessens or where some obstacle is greater than the force of the current bearing it on.

Here we find a *tributary* very different from the main stream and showing us many new conditions. It is in a deep and narrow gully with very abrupt clay banks, without vegetation. We follow this gully to its upper end and find it working its way back into a ploughed field. Here it is piled full of brush and stumps. Why? What do you think of the rate of wear here compared with that in the main stream above Why is this? Notice the banks. The children see that they are full of tiny gullies running together. They say this would be a fine place to watch the wearing away after a rain. Along the side of this gully we were once lucky enough to find a fresh *landslide.* A little tree had been transplanted without injury along with its generous foothold, to the gully below. Just what brought this landslide about, is a question for the children to answer. Let us notice the condition of the transported block several months from now; also that of the bank above from which it came. Do you think they will look just as they do now? What changes do you expect to see?

Let us follow down the tributary to its mouth. How does the slope of its bed compare with that of the main stream? This more abrupt slope, together with the steep banks and the bare soil, causes a great deal of material to be loosened and carried off by the stream. What effect will this have on the slope? On the stream bed? Does much of this loosened soil borne away by heavy rains remain below in the tributary bed? Why not? Down at the mouth of the tributary we find some of it. Why should it stop here? Notice the shape of the *deposit.* This is an *alluvial fan.* The children see why it is called a fan and the teacher contributes to their understanding of alluvial.

In the little main stream near here we find a *cut-off* and question how this came about. As we go along we pass the mouths of several tributaries. Following some of them up we find that they in turn receive the waters from other tributaries in rainy seasons. We conclude that the amount of material carried away by these tributaries is considerable. We notice how much land is drained by these little streams and thus build up our notion of a stream basin. The main stream with all its tributaries is a minature river system.

The above out-of-door observations ought to receive the time of three or four trips to the field. There is danger of confusion, naturally, if a great deal of such new material is attempted at once.

If for any reason the teacher does not think it wise to have so much work outside the schoolroom she can give attention chiefly to such points as she feels the children are least likely to have seen by themselves and to such as can not adequately be described verbally and by the use of sand-table, blackboard, pictures, or any other means obtainable indoors. Sometimes the reasoning out of why these things are as they are can be done as well away from the things discussed.

Even when as much time is taken for the out-of-door-

study as seems profitable, the work is by no means completed. A series of class room recitations must follow to establish the observations made and drill on new terms. This will require much repetition.

After a week's work based on the above field trips has been done in class, it will be well to go to a different place and study the same sort of phenomena again. Here the manner of approach will be somewhat different, as there will now be a recognition of what is more or less familiar. This second stream presents features which we have not seen before, also; its bed is free from grass and consequently the work done by the water is more in evidence. Here we will pay special attention to the kind of material carried by the stream and to the shifting of the stream bed. Children are very likely to think of things existing now as they always have been, so the notion of a whole stream's changing its course will be a new one.

Let us again notice at a curve the concave and convex banks. How do they compare? On the abrupt side notice the current. How is it by the longer, gentle slope? The children will notice the current is swifter on the concave side and is cutting rapidly. The bank has been recently so cut under that a part of the ledge has broken off. We see the disintegration of the mass, the sifting of soil particles, and the carrying away. On the opposite side, on the contrary, what is becoming of material carried in suspension? We see soil, sand, and gravel dropped here. The bank is consequently being built farther out into the stream. This means that the stream bed is gradually shifting. After many years it will occupy quite a different position. We recall in Happy Valley the comparatively deep valley in which the stream wandered about over a space considerably wider than that marked by the course of the stream. Especially was this width greater toward the lower and older parts of the stream. What made this deep, wide valley? Is

it possible that the stream has done all this? It may be that the children can imagine and understand that this valley has been cut out by the stream and that the terraces at different heights represent old valleys over which the stream bed shifted in former times. Have you any notion how long this took? We simply want to realize that it took a long, long time. Trees growing on the different terraces give us some notion of the minimum time since the stream flowed where they are.

The formation of a whole valley with its terraces may prove too difficult a conception for the pupils at this age. If so, it can be left till a later time. The pupils can at any rate be prepared to understand it by watching the actual cutting, carrying, and shifting taking place before their eyes. Any attempt to go much beyond this in most of this work is likely to be unprofitable, owing to the difficulty children of this age have in thinking of any change taking place gradually and involving a long period of time.

Cut-offs in process of forming are seen in several places along this stream. The teacher may call attention to the *ox-bow* lake resulting and teach the term if she has the time. We have a good chance in going down this stream to notice the amount and kind of material that the stream carried in flood time and deposited along the sides of its bed. We noted that it was very much greater in amount and contained much heavier masses than could be carried by the ordinary *volume* of water at the ordinary rate.

Waterfalls and short stretches of tiny rapids are seen in this stream. A small lake above a dam is another feature that is easily understood. Various land forms are found along the stream—peninsulas, islands, capes, and isthmuses.

The quantity of fine material left on each side of the bed after the stream recedes is adding toward the forming of a *flood plain.* Where is this higher? Why? Wherefore the general evenness of the surface? What kind of soil is this?

After the above out-of-door work and its review and recitation, the course of some ideal stream may be imagined and described—for instance, we can trace a stream rising in a mountain region till its waters reach the sea. The kind of slope, current, volume of water, kind of work done, and character of material carried in the beginning, middle, and lower courses of the stream will be discussed and compared.

It will be noted that this work which is first taken up in October is to be continued the following spring. The spring month will furnish the better opportunity for the study of some points. The effect of soil saturation by winter snows will be seen when we note the washing power of the spring rains.

After the second series of lessons, again comes the indoor review and drill. Sand-table modeling, drawing, description, and pictures may all contribute toward the enrichment and application of the notions got in the field. Definitions should be formed. These should be the children's own, modified only so far by the teacher as is necessary for accuracy.

The result should be a permanent available possession in the way of mental pictures of phenomena, together with such understanding of their relation as will prove of considerable help in later reading, travel, and study.

THE SUMMER SCHOOL.

The Summer Session of the Eastern Illinois State Normal School will begin Monday, June 18, and close Friday, July 27. Fifty courses will be offered in all departments of the school by the faculty, assisted by Supt. Darius Steward, of Stillwater, Minnesota. There is no charge for tuition. An incidental fee of one dollar is charged for the use of libraries, shops, and laboratories. Text-books may be rented for one dollar or bought, at the pleasure of the student. Board and room can be had at very reasonable rates. During the past year a number of new houses have been built in Charleston, and it is expected that there will be ample accommodations for all students who come. For the "Announcement" and any further information, apply to

PRESIDENT L. C. LORD,
Charleston, Illinois.