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SUGGESTIONS FOR THE TEACHING OF GEOGRAPHY IN THE UPPER GRADES

BY W. C. RUEDIGER

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THE study of geography in the elementary school is quite uniformly shaping itself into the form of a double 'spiral,' preceded by a somewhat detailed consideration of the home environment. This gives us (1) home geography, which is beginning to take on a definite form and to receive attention proportionate to its importance; (2) the first spiral, represented by the elementary text-book; and (3) the second spiral, represented by the larger or Grammar School Geography. A fair division of time places the home geography in the 3A and 4B grades, the elementary book in the 4A, 5B and 5A grades and begins the larger book in the sixth grade.

Although these three divisions of the work all conspire to give the pupil a knowledge of the earth's surface in its relation to man, they nevertheless differ quite widely in subject matter, aims, and methods of treatment. The method in home geography is almost entirely inductive. The pupil is led to study his environment first hand in order to gain a knowledge of and a mastery over it, and to accumulate a stock of concepts by means of which he may later interpret the geography of regions remote from home. Much that might be classed as 'nature study' forms a part of this work, and geography and nature study should not at this time be treated in separate classes.

In the study of the elementary book the pupil is given his first general view of the world. The concepts gained in home geography are drawn upon and applied. Description is a leading characteristic here and the teacher should constantly aim to make the work concrete and realistic. Much use should be made of pictures, and the pupils should be given vivid mental pictures of every region studied. The details of agriculture, lumbering, mining, and other industries should be brought out and made meaningful.

The distinctive feature of the second spiral in geography is the greater stress that is laid on the tracing of causal relations. While this feature is not omitted from the preceding work, it is nevertheless given a subordinate place; and on the other hand, the study of *facts* as such is by no means eliminated in the advanced work. An accurate knowledge of facts is a prime requisite in the deductive process, for only in the degree that we have this knowledge can we draw correct conclusions. From a knowledge of the position, size, contour, surface features, and prevailing winds the pupil is led

to infer what the climate, productions, and chief industries of the country should be. Approached in this way geography becomes a science, and the knowledge gained is rational and integrated, informing one not only of the facts, but also of the reason underlying the facts. Knowledge of this kind is more easily retained and gives one a sense of mastery over the subject-matter.

MATHEMATICAL AND PHYSICAL GEOGRAPHY: In order to gain an organized knowledge of geography, it is necessary that the pupils have at their command some of the leading facts and principles of mathematical and physical geography. These form the basis of all scientific geography, and a knowledge of them must be presupposed if the subject is to be understood from the bottom up. Ultimately not only the plant and animal life of the globe, but all the activities of man are regulated by them. Without a knowledge of these principles on the part of the class, a country could not be studied in the deductive manner above indicated. There is, therefore, ample justification for devoting perhaps a half year at the beginning of the larger book to the study of the fundamental facts and principles of mathematical and physical geography.

Owing to the immaturity of the pupils, the teacher must content himself with a somewhat elementary treatment of these subjects at this time. Some parts may profitably be left over for the review in the eighth grade or for the high school. But if the topics are carefully and logically presented in an inductive way by means of a globe and simple illustrations and experiments, even a sixth grade class will go far in understanding them. What is needed first of all is a clear and thorough knowledge of these things by the teacher. Many of the facts of mathematical geography may be presented to the class as problems to be discovered from the globe, and if this is ingeniously done comprehension is almost assured. As a problem to be so discovered may be mentioned the position of the tropics and polar circles; what locates them just where they are?

In the fifth and sixth grades the pupils are easily interested in the solar system and the constellations, and an elementary knowledge of these may be presented. The motions of the earth, or rather, the apparent motions of the heavens due to the motions of the earth, can be observed only when some of the constellations are known. The conception of the earth as a body floating in space seems to be hard for many people to grasp. The idea that it floats in the air must be guarded against. The child is greatly aided in getting the right conception by seeing the earth in its relation to the other planets,—a relation that is easily diagrammed. Furthermore, it is only as he sees the earth in space that the pupil can fully grasp the conceptions of 'up' and

'down,' without which he can never realize that the people on the other side of the earth walk with their feet down just as we do. It becomes apparent that the directions up and down are purely relative to the earth and do not exist in space.

There is one thing, however, that the teachers in the upper grades should never forget and that is this: The pupils' knowledge of the principles brought out in the first part of the larger book should be *used*. These principles should be used in connection with every continent, and nearly every country studied. Only in this way can a thorough knowledge of the general climatic conditions, and all that results therefrom, be gained. Whenever necessary the teacher should go back to the globe and to a review of the winds, rainfall, and ocean currents. When this is systematically done the pupils soon gain a mastery of the principles in hand, and the causes for the existence of deserts in certain regions, for the wet and dry seasons of California, Oregon and Washington, and other problems of that nature, will not form stumbling blocks to them.

The following is a suggestive outline to be used as a basis of study. It is in a few respects too comprehensive for the sixth grade, and the topics that are omitted here may be included in the final review. When an outline like this is used, the text-book should be made subordinate to it. That is, the work should be given according to the outline and the text used as a reference book. This will afford an easy opportunity to use several standard texts in the class. In general, every topic should be developed by the teacher before any text-book study on it is assigned.

OUTLINE: 1. Where is the earth?

(Bring out the conception that the earth is a body floating in space, unsupported. It does not float in the air, but the air is a part of the earth.)

2. Meaning of "up" and "down."

3. Other planets and solar system.

(Lead the children to look up the visible planets in the sky. If possible, point out some of the constellations for the children, especially those in the zodiac and those about the north pole.)

4. Shape of the earth.

(Bring out from five to ten proofs that the earth is a sphere and make sure that each is understood. Demonstrate to the class mathematically that the roughness caused by mountains is inconsiderable.)

5. Is the earth a perfect sphere?

Reasons for believing that it is flattened at the poles are:

a. Measurement.

- b. Weight increases toward poles.
 - c. Flattening must result from rotation.
 - d. Other planets are flattened at poles.
6. Size of the earth.
(Diameter approximately 8,000, circumference 25,000 miles. Make these numbers meaningful by means of problems. How long would it take a train to go 25,000 at the rate of 30 miles an hour? etc.)
7. Motions of the earth. Rotation and revolution.
- a. Rotation: What moves visibly?
Proofs of rotation:
Deflection of falling bodies.
Foucault's pendulum experiment.
Flattening at poles.
Daily motion of heavens.
 - b. Results of Rotation:
Unit of time,—day.
Axis, poles, and equator.
Cardinal points.
Longitude.
Standard time.
International date line.
 - c. Revolution: What moves visibly?
Proof: The assumption that the earth revolves about the sun makes the mechanics of the solar system simple and conforms to the law of gravitation.
 - d. At this point bring out clearly the position of the earth in its orbit.
 - (1) Axis inclined $23\frac{1}{2}$ degrees.
 - (2) Axis always parallel with itself.
 - e. Results of Revolution:
 - (1) *Year:* In connection with the length of the year the calendar should be taught. (The year is 365 days, 5 hours, 48 minutes, and 46 seconds in length.)
 - (2) *Seasons:* In teaching the cause of the seasons teach first the heating of the earth.
Why is it warmer at noon than in the morning or evening? Bring out two reasons distinctly, making them clear by means of diagrams:
 - (1) Rays cover smaller area at noon.
 - (2) Rays pass through less atmosphere.

Lead the class to see that these two factors apply in explaining the temperature difference between summer and winter, and that there is yet a third factor: There is much more sunshine in a day in summer than in winter.

Now let the pupils place the globe in position for spring, summer, fall, and winter, explaining every step. Lead them to see that three things—(1) inclination of axis, (2) parallelism of axis, and (3) revolution—are all necessary to produce the seasons.

(3) Latitude and Zones: Relate zones to seasons.

(1) Where do the sun's rays strike perpendicularly in summer, winter, spring, and autumn?

(2) How far north and how far south do the rays reach in each of these seasons?

(3) What, then, determines the boundaries of the zones? Are these boundaries artificial or natural divisions?

(4) Are the zones heat or light belts?

(5) Show how latitude naturally results from observation of distribution of sunlight at different times of year.

8. Climate and its relation to heat belts.

	{	A. Elements.	{	1. Temperature.
				2. Moisture.
				3. Sunshine.
				4. Wind.
a. Climate:	{	B. Determining factors.	{	1. Latitude.
				2. Altitude.
				3. Winds and Ocean Currents.
				4. Proximity to Sea.
				5. Mountain Ranges.

Teach both A and B inductively.

b. Winds. Cause. (Use experiment.) Show relation to temperature.

(1) Trade winds. Direction. What determines direction?

(2) Belt of calms or doldrums; horse latitudes.

(3) Prevailing Westerlies.

(4) Monsoons.

(5) Land and sea breezes.

c. Rainfall. Causes. (Use experiments and familiar illustrations.)

Give inductive lesson. Show relation to doldrums and mountain ranges. Study world distribution.

d. Ocean currents. Causes. Directions how determined?

THE STUDY OF A CONTINENT OR COUNTRY: The following outline may serve as a guide in studying a continent or country. Time and energy are saved when the teacher has a definite plan of procedure; but such a plan must not be allowed to crush out the individuality of the teacher, or to make the work monotonous. For this reason a plan should never be followed slavishly. Wholesome variety may be secured by judicious deviation from the outline, the guiding principle being the high points of interest in the subject-matter. Begin the study of a country with that feature which stands out most prominently. Such features are usually the result of surrounding conditions and hence make the logical as well as the psychological starting points. Italy may be approached through the historical and religious interest attaching to Rome, Spain through the characteristics of her people, Holland through the adverse conditions of life, and England through her advantageous position for commerce.

OUTLINE:

1. *Preparation.* Let us suppose that the continent to be studied is Asia. The first recitation can profitably be spent by talking with the class about Asia in general.
2. *Position.* As to latitude and longitude, in relation to the other continents. As to wind systems.
3. *Size and Extent.* Mostly in a comparative way, but the accurate determination by latitude and longitude is not to be neglected. This, as well as the area in square miles, may serve as bases for comparison. The size of the United States and that of the home state should be well known. To the east and west extensions the relation of longitude to time may be applied in comparison. For instance, the extreme east and west points of Asia are ten hours apart while similar points in the United States are but four hours apart.
4. *Surface.* Highlands and lowlands, mountain ranges, lakes, rivers, etc.
5. *Coast.* Regular or irregular?
 - a. *Water forms.* Oceans, gulfs, seas, bays, straits, and channels.
 - b. *Land forms.* Islands, capes, and peninsulas.

These topics appeal almost entirely to map study and should be accompanied by map drawing, the chief object of which is to teach form, size, and position. In map drawing the principle of going from the indefinite to the definite may be applied. Begin with a rough and quick free-hand drawing, or even with straight lines representing the general shape of the continent, and proceed gradually to more and more definiteness, ending with a somewhat finished map showing latitude and longitude. As guid-

ing lines in the more accurate maps the lines of latitude and longitude are better than artificial construction lines, for they teach position on the globe as well as act as guides. After the continent as a whole has been considered, and while the different countries are being studied, it will be of advantage to let each pupil make a progressive map.

6. Climate.

7. Industries.

8. Products.

9. Cities, routes of trade, etc.

The treatment of the last four topics should be essentially different from the first four. The distinguishing feature here should be logical deduction. The climate should be deduced from the position, ocean currents, prevailing winds, coast line, and surface features. What facts would give Europe the same climate as the United States or North America, and what facts would make the climate different? Productions may next be deduced from climate, position and coast and surface features; and the location of important cities and routes of trade mostly from surface features. After these things have been studied in this way they may be read up in the text and in reference books and discrepancies noted. In each case where the facts are found to be at variance with the deductions, the reasons for the disagreement should be determined if possible.

After a continent has been studied in this manner, the separate states or countries of that continent may be taken up according to the same outline; but the treatment may be much abridged in places. Climate, productions, and occupations are peculiar to physiographical rather than to political units. In these respects, therefore, political divisions may be most economically studied by noting their relation to continental regions.

In connection with the geographical work, the national song of a country should be learned, if possible, and before the country is left, a special 'day' may be set apart for it. We may have a Scotch day, a German day, a French day, or an English day, depending on the country under consideration. At that time the class may imagine itself transported to that country, and the literature, songs, customs, occupations, and scenery may be illustrated. Photographs, lantern slides, and stereoscopic views may be used to good advantage here.

THE STUDY OF A TRADE CENTER: St. Paul-Minneapolis as a type. (Adapted from McMurry's *Method of the Recitation*.)

I. *Preparation.* Where are these cities? What do you know about them? Why called Twin Cities? Why is Minneapolis sometimes called the 'flour city'? If history has been studied, recall Hennepin's

- trip. Talk also in a general way about the wheat fields and prairies.
2. *Location.* Why two cities? Bring out the fact that St. Paul was located at the head of navigation on the Mississippi before the time of the railroads, and that after the railroad simplified the problem of transportation, a city could be started where it could take advantage of the water-power afforded by the falls of St. Anthony, thus giving rise to two cities near together. Organically, of course, these cities are but one trade center.
 3. *Water power.* Of what use is the water power? This question leads naturally to the consideration of the saw-mills and flour-mills, and thence to lumbering and agriculture, both of which may be studied in detail. The guiding conception in the teacher's mind should be to trace cause and effect and to build up in the minds of the pupils a picture of the leading activities of that region. Much help may be derived here from pictures found in geographies, railroad folders, current magazines, etc.
 4. *Lumbering.* A detailed consideration may include the pine forest, cutting and sawing the timber, the lumber camp, swamping or loading on cars, the drive, rafting, the saw-mill, and the transportation of logs and lumber down the Mississippi by means of steamboats. Planing mills, making sash, doors, mouldings, etc., may be considered in connection with saw-mills.

What becomes of the lumber finished at St. Paul and Minneapolis? Some is used in the cities, but most is shipped to the prairies lying to the west, southwest, and northwest, where it is used in the smaller towns and by the farmers. It is now transported mostly by means of the railroads, which, on their return trips, bring back train loads of wheat to be made into flour in the big mills at Minneapolis. In this connection the function and importance of a railroad in developing a country may be brought out.

5. *Agriculture.* Next in order should be a somewhat detailed consideration of agriculture. This might include the preparation of the soil, seeding, harvesting, thrashing, elevators, transportation, and milling. The farmers are enabled to pay for their lumber, farm-machinery, etc., by means of their crops.

What is done with the flour? Much is shipped to Hamburg and Liverpool via the Great Lakes and New York, and more to the central states via Chicago. This may lead to a consideration of trade routes and their relation to production, population, and physical features.

6. *Other industries.* What other industries would naturally spring up

- at St. Paul and Minneapolis as the surrounding country developed?
- a. Manufacturing:—Furniture, Wagons, farm implements, barrels, etc.
 - b. The cities would become a wholesale distributing center for dry goods, groceries, machinery, drugs, china ware, books, etc.
7. *Other cities.* Before leaving this section of the United States, Duluth and West Superior, and a number of cities along the upper Mississippi may be briefly studied. An imaginary trip may be taken down the river.

An outline like the above should be made to serve a larger purpose than the mere study of a trade center. An entire country should be reviewed in sections by means of it, after it has been studied as prescribed by the text-book. The entire United States might be reviewed about such centers as New York, Boston, and Philadelphia in the east, Charleston and New Orleans in the south, Chicago, St. Louis, and St. Paul-Minneapolis in the middle west, Denver and Butte in the mountain and mining region, and Seattle, Portland, and San Francisco on the Pacific coast.

APPARATUS AND COLLECTIONS: Practically all the geography outside of the home environment must be taught by the indirect method. For obvious reasons the class cannot deal directly with distant regions, but must depend on secondary sources of information. This fact, perhaps more than any other, makes geography the most difficult subject to teach satisfactorily in the elementary curriculum. In language, reading, spelling, arithmetic, and elementary science the object of study is dealt with more or less directly by the class, so that first-hand interest is aroused; while in history, although dealing with its subject matter indirectly, we have mostly narration which is inherently easier for the mind to follow than static description. In geography, however, most of our material must be secured from such secondary sources as text-books and books of travel, which are largely descriptive, and from maps and pictures.

Recognizing these limitations, we see the necessity of resorting to such devices as will aid in bringing concreteness and directness to the work. Every school should have a museum of specimens from all parts of the globe, for illustrative material is needed in nearly all classes, and almost every day. But if the school is lacking in this respect, much may still be done by the teacher. There is much that he may have in the way of specimens and pictures in his private equipment. Besides maps and globes, which are indispensable, some or all of the following are within easy reach of the teacher.

1. Pictures.

- a. Photographs.
- b. Stereopticon views.
- c. Stereoscopic views.
- d. Views of the world (in book form).
- e. Magazine and newspaper cuts.
- f. Railroad folders and other advertising matter.
- g. Illustrations from books.

Sets of pictures illustrating scenes, trades, and industries may be obtained at reasonable rates from the Nature Study Publishing Co., 521-531 Wabash Ave., Chicago, and many things of value may be obtained from the departments of the United States government. This material should be collected and preserved in a systematic way. So as to be easily accessible, it should be classified and indexed, the card catalogue system according to the alphabet being perhaps the most serviceable.

2. Products and Specimens.

- a. The grains, as wheat, oats, etc.
- b. The plants and seed-pods of these grains.
- c. Wood of many kinds.
- d. Leaves and branches of these woods.
- e. Plants of cotton, tea, coffee, spices, etc.
- f. Curios from different countries.
- g. Rocks, soils, and minerals.

DEVICES AND SUGGESTIONS FOR REVIEW WORK: The ingenuity and resourcefulness of a teacher are nowhere more thoroughly exemplified than in a review exercise. No teaching exercise is more illuminating than a thoughtful review, while, on the other hand, no exercise is more stupefying than a review devoid of thought. In the review, the subject should, if possible, be approached from a standpoint different from that of the original presentation. The subject should be viewed in "new and unexpected ways, in new lights, in altered perspective, in fresh connections." (Chubb.) This insures continued interest, produces new lines of association, and leaves the knowledge in a more thoroughly integrated form. Cleverness at devices is no less essential in successful teaching than an intelligent review. They may be spoken of as the utensils of instruction. The following devices and suggestions may be used at the discretion of the teacher. Some of them will serve only as review exercises.

Mathematical geography may be reviewed and tested in topical recitations illustrated with the globe and drawings, and by means of problems

embodying the principles of the earth's motions and position in space. The following may serve as illustrations:

Where are the days always equal? Why?

Under what conditions would there be no change of day and night? Illustrate with globe.

In the year 1904 the earth rotated 367 times. Why? Discover with the globe.

Where do growing crops receive more sunlight, in Florida or in Montana? Why?

Are the zones natural or artificial divisions?

What change would bring the Arctic Circle through your home?

Under what conditions would there be no temperate zones?

Many interesting problems suggest themselves in regard to latitude, longitude, time, and the 'date line.' (For further suggestions see Jackson's *Astronomical Geography* and Gillan's *Lessons in Mathematical Geography*.)

Dissected maps may occasionally be brought in to good purpose in reviewing and impressing form, size, position, and direction. Is the pupil able to recognize by their shape the different states and countries when presented out of their relation to the entire map? and can he place them in their proper positions on the map? Comparative areas may be impressed by bringing dissected countries constructed on the same scale in juxtaposition. Maps to be used in this manner may readily be made by the pupils. Let the map be carefully drawn first and then dissected.

As a map review of a continent or state, an outline map may be placed on the board and the class may be called upon to supply the names and details. The rivers, position of cities, boundary-lines, etc., may or may not appear in the outline; depending on the nature of the review. With some variation this may be made a geography game. Geography games, occasionally used and judiciously conducted, bring about excellent results in clearness of knowledge. They are almost sure to be accompanied by keen attention and vigorous thought.

To test the ability of logical inference, a detailed map of 'nowhere' may be placed upon the board and the class may be asked to infer the probable climate, productions, and industries, giving reasons for every statement. In examination, a map of this nature may serve as a test in map reading.

Questions like the following 'sprung' on a class occasionally have a good effect.

1. Which is larger? and how much larger? Cuba or Montana? Texas or Australia? Lake Superior or the Caspian Sea?

2. Name the largest state east of the Mississippi.
3. Which extends farther south, Africa or South America?
4. What foreign country would you reach in going due east from your home? In going due west?
5. Could you reach South America in going due south from your home? From Chicago? (In dealing with questions of size and direction, a globe is usually better than a map because maps are often much distorted toward the poles.)

Some aspects of geography may be treated to advantage in the language and arithmetic classes. This will do more than furnish material for these classes. It will direct attention to many things that would otherwise pass unnoticed, and by bringing the material into use, the knowledge will become more thoroughly organized.

The arithmetic class may deal with such topics as the population of states and cities, the areas of continents, states, and bodies of water, the output and navigability of rivers, exports and imports, and commerce in general; while in the language class may be treated the customs and manners of people, occasional imaginary journeys and descriptions, and the stories of agriculture, stock raising, lumbering, mining, etc.

BIBLIOGRAPHY: The following literature is recommended in the belief that books that broaden and deepen the teacher's knowledge in fields related to geography will do more for vital work in the class room than books on method. A more extended list may be found in Redway's *New Basis of Geography*, chapter XII.

Several text-books of geography, especially Frye, Redway and Hinman, Tarr and McMurry, and Dodge.

A set of geographical readers, especially Carpenter's.

A few good books of travel.

A text-book of physical geography, especially Davis' *Elementary Physical Geography*.

A text-book of commercial geography, as Adams' or Gannett, Garrison and Houston's.

A text-book of geology, as Brigham's.

A text-book of astronomy, as Comstock's or Bowen's.

Redway, *The New Basis of Geography*, Macmillan.

Fiske, *The Discovery of America*, Houghton, Mifflin & Co.

Geikie, *The Teaching of Geography*, Macmillan.

Redway, *The Reproduction of Geographic Forms*, Heath & Co.

Nichols, *Topics in Geography*, Heath & Co.

Russell, *Rivers of North America*, Putnam.

Jackson, *Astronomical Geography*, Heath & Co.

Gillan, *Mathematical Geography*, Gillan & Co., Milwaukee.

Teachers College Record, March, 1901. Devoted to geography in the Horace Mann Schools.

Valuable maps, charts, and data may be secured from departments of the United States government. The Coast Pilot Charts, Weather Bureau maps, and maps of the Geological Survey and the Coast and Geodetic Survey may be mentioned. A list of government maps suitable for school use may be found in *Government Maps for School Use*, Henry Holt & Co., New York.

The consular reports are rich in geographical information and are valuable for reference in the upper grades. The *Year Book of the Department of Agriculture* should be in every school library. These may be obtained free by application to your congressman.

Sets of pictures illustrating scenes, trades, and industries may be obtained from the Nature Study Publishing Co., 521-531 Wabash Ave., Chicago.

SOME NOTES ON SOUTH AFRICA

The botanists told us of the extraordinary richness of the South African flora; for example, of four hundred and twenty known species of heather in the world, four hundred are found in the southwest coast belt of Cape Colony, and three hundred are found on Cape Town peninsula, an area about equal to that of the Isle of Wight. The dry interior afforded many examples of plant adjustment to aridity: small leaves, covered with down or felted hairs, to reduce evaporation; quick growth of annual plants, which reach maturity in the short wet season and remain as seeds for the rest of the year; perennials which shrivel as if dead in the dry months, and become bright and green after a few hours of rain: a double set of roots, the tap root going down deep for ground water, and a film of surface roots, as if to gather moisture from dew. Very curious are the plants (mostly Proteas) in which pollination is effected by birds instead of insects; not by birds of the humming type but by perching birds, and as if to meet them the flowers are turned backward from the end of a twig toward the branch. While the gums (Eucalyptus) and wattles (Acacias) have been beneficially introduced in great number from Australia, the prickly pear (*Opuntia*) from America has become a pest, even causing the abandonment of certain farms.

—W. M. Davis in *Boston Evening Transcript*.