METHODS OF TEACHING

CHARTERS

This book is DUE

METHODS OF TEACHING

THEIR BASIS AND STATEMENT
DEVELOPED FROM A FUNCTIONAL
STANDPOINT

REVISED AND ENLARGED

BY

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PREFACE

The point of view from which the problems of teaching are discussed in this text is a functional one. It presupposes that all subject-matter has been created and preserved by the race to satisfy needs and solve problems, and that in the schools such parts of this subject-matter as satisfy the most fundamental needs are taught to pupils. But this is not done in indiscriminate order. Rather, in the main, any unit of subject-matter is best presented when the need for whose satisfaction it is preserved is potentially or actually present in the experience of the pupils. In accordance with this view the intrinsic function and the structure of units of subject-matter become of prime importance, involving a phase of methods of teaching to which relatively little attention has been paid in pedagogical literature. To complete a practical description of this conception as applied to teaching it has been found necessary to discuss the methods of arousing the appropriate needs and the conditions under which they are found present, and to investigate the methods pursued by experience both in satisfying these needs, to the aid of which subject-matter is invoked, and in securing the maximum degree of such satisfaction.

It is hoped that the point of view here developed will not be confused with the problem of school discipline concerning the authority of the teacher. In answer to the question, Are pupils expected to study subject-matter if they do not feel the need for it? only an affirmative answer can be given, and such answer should be given emphatically. The points to be remembered are these: Authority is the buttress of the school; but other motives than that of mere obedience to authority may and should be used. When other motives fail recourse should be had to obedience, to the study of subject-matter merely because it is prescribed by the school authorities.

For the philosophical standpoint utilized and applied I am indebted to my instructors in the University of Chicago, and particularly to Professor John Dewey, and for the psychological analogies which have steadied and illuminated the application of this standpoint I am under obligation to Professor J. R. Angell. For assistance, through criticism and suggestion, acknowledgment is made to Dr. J. H. Coursault of the University of Missouri, to Dr. I. E. Miller of the Milwaukee State Normal School, to Dr. G. M. Whipple of Cornell University, to Dr. A. W. Vining of Brandon College, to Mr. R. K. Row of Chicago, and to my wife. For assistance in developing the standpoint and for forbearance while this was under way I am deeply grateful to my former colleagues in the Winona, Minnesota, State Normal School. For suggestions from sources too numerous to acknowledge individually I am indebted to writers upon educational problems. W. W. C.

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PREFACE TO THIRD EDITION

After teaching the old edition of this text since its publication three years ago, I have found certain changes advisable. In the former book my interest, being chiefly in the problems—need and subject-matter—led me to underemphasize the topics discussed in the latter part of the book. This weakness became evident as soon as the text was used in class. Hence, in revision an attempt has been made to supply a basic text by balancing the various topics and giving a fairly complete list of references for class reading. The exercises at the end of each chapter are intended primarily to get the students into the habit of thinking out the principles in terms of concrete illustrations.

For assistance in pointing out weakness and suggesting improvement in the text, I wish to thank all the instructors who have used it, but particularly Miss Ida M. Densmore of the Kalamazoo State Normal School and Dr. C. W. Stone of the Farmville State Normal School.

W. W. C.

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CHAPTER I

THE FUNCTION OF TEACHING

Section 1. Statement of Function

The purpose, or function, of teaching is to assist pupils to appreciate and control the values of life.

This statement differs from that of the McMurrys when they say:[1] "One leading aim of instruction in every important study is a mastery, in the full sense, of its general truths." In their statement, the "mastery of general truths" is the distinguishing characteristic; in ours, the "appreciation and control of values." It differs also from Rowe's formulation:[2] "In all types of learning it is evidently the organization of experiences which is the underlying important element common and essential to all. In the realm of knowledge it implies classification, generalization, system, or orderly arrangement of ideas; in the realm of practical skill it implies automatic action, appointed times, places and even ways of acting—in a word, habit." Here the organization of knowledge into systems and of action into habits are the distinguishing elements of the standpoint.

The industrious teacher, reading pedagogical literature for pleasure or for profit, chafes a good deal at the differences between writers in the same fields, and occasionally

[1] *Method of the Recitation*, p. 12.

[2] *Habit-Formation*, p. 7.

fretfully inquires about the time when the same thing will always be stated in the same words. Yet there is a definite value attached to this difference in terminology. Each writer lays emphasis in a different place; each is, perhaps, equally right and correspondingly equally wrong. However, because each lays emphasis in a certain place, he works that part of the field out thoroughly and hands it over to investigators as his contribution.

For instance, in the opening paragraph the McMurrys are quoted as saying that the mastery of general truths is the aim of education, and just because they made that the aim they worked out methods corresponding thereto, and gave us the technique of inductive development. This is the Herbartian contribution, in part, to American pedagogy. Because they took a different aim, they worked out a new part of the field. Again, Rowe selects *habit-formation* as the aim of education and he, on his part, works out a part of the field that the McMurrys did not develop—methods of drill and organization. And now in this text another function is stated. As a consequence, it is hoped that other parts of the field—particularly, subject-matter and motive—will be developed, while the results secured by other writers will be summarized and organized.

In brief, then, the teacher should welcome the study of the subject from different points of view, since each point of view develops a new part of the field.

Because the terminology in which the function of teaching was stated above is probably unfamiliar to many readers, space will be given at once to a brief explanation of its meaning, sufficient for an immediate starting point. But, since the whole text is merely an analysis of the concepts involved and implied in the statement given, a systematic understanding will not be attained until the book is finished and the analysis completed.

Section 2. The Values of Life

Values of Life.—The most important term in our definition is *values of life* because all motives for action, as we shall see in Chapters IX-XI, are based on values. If an orator wishes his hearers to follow his advice, he must make them feel that what he advises is worth their while, that what he says is true, and that what he asks is good for them. If he fails in this, they will not follow him. If a salesman desires to sell an article to a customer, he must demonstrate that this article will be useful in gaining something that the customer wants. Otherwise there will be no purchase. If a teacher wishes his pupils to perform an assignment, he must make them feel that it has some value, or it will not be done.

Range of Values.—The range of human values is as broad as life itself. Hopes, aspirations and ideals, joys and sorrows, business, family and church, are valuable in differing degrees. Avoidance of punishment, approbation of teachers and of associates, arithmetic, history, geography, games, sleds and toys, may possess charms for the developing child. Indeed, whenever an action is observed, some value has prompted it, and since kinds of action are multitudinous, we can infer that values are likewise multitudinous.

But while their range is so broad and their number so large, values may be grouped incompletely under heads useful for the purposes of teaching.

Aims of Education.—It is an interesting fact that each of the statements of the aim of education propounded since the birth of time and found scattered through the writings of men of all ages has some great human value at its core. To Socrates, the necessity for formulating universals (the great principles that would give certainty to thought in the midst of the intellectual chaos of middle Greek history) was the paramount value of his age, and he made this ability to formulate universals the aim of education.

The souls of the members of the early church glowed with missionary zeal. To them the moral regeneration of the world was the paramount value of life, and they made morality the aim of education. When the nations of Europe awoke from the intellectual coma of the Dark Ages, and "new aspirations for the development of a free personality defined on both the intellectual and the emotional side as well" were re-born, a well-rounded, fully-matured individuality seemed the greatest thing in the world, and the aim of education was accordingly formulated as the development of this "liberal" individual. Later, when the first enthusiasm of this eloquent conception had died, and only the classical husk was left, it was held among the "cultured" classes that the superlative value of the times was to become acquainted with Greek and Latin, and the aim of education was accordingly formulated in those terms.

The increasing value of the "individual" which brought on the French Revolution was voiced by Rousseau, who, therefore, held that the aim of education is to give the child a chance to develop himself in the direction in which his "natural" instincts, impulses, and tendencies will lead him. Today, when the individualistic conception has come to have gigantic power in moulding the actions of men, a new value is rising to national consciousness—the value expressed in the Golden Rule—social helpfulness, or enlistment in the service of society. This value is accordingly formulated in the term "social efficiency" as the aim of education.

Other values have been implied in other aims of education. Piety, knowledge and eloquence, complete living, citizenship, the development of mental faculties "trained to come to heel by a vigorous will," and earning a livelihood, are a few of them. Each of these today, somewhere, or by somebody, is held to be a value, and all, in varying orders of emphasis, are held by everybody as values appreciated or worthy of appreciation.

The Virtues.—From the first awakening of moral aspirations and the first attempts to explain moral conduct, men have been picking out those factors of social well-being which, when utilized, have been morally helpful, and have called them the virtues. But each is a value. In fact, society considers some of them to be so valuable that it has taken steps to separate from the rest of society those men and women who do not practice them, and for the violation of some of the more important virtues has taken the lives of the transgressors.

Hyde has a simple though incomplete classification which will be of use to teachers. His list is as follows:[1]

Virtue, temperance, neatness, cheerfulness, industry, economy, honesty, purity, veracity, prudence, orderliness, courage, sensitiveness, simplicity, kindness, love, benevolence, forgiveness, fidelity, loyalty, patriotism, public spirit, conscientiousness, holiness.

The older texts on school management, with their thoroughgoing moral tendencies, classify the *school* virtues. For instance Millar[2] includes in his list *regularity, punctu-*

[1] *Practical Ethics,* pp. vi and vii.

[2] Millar, *School Management,* pp. 81 ff.

ality, industry, quietness, neatness, obedience, temperance, honesty, courtesy, and *self-control.*

The virtues, like the instincts, are, in a sense, means of conserving or controlling values. Veracity, for instance, became a virtue not by chance, but by choice. It was found that veracity was, in the main, a good means of preserving and furthering those values which were paramount, such as self-preservation and social solidarity. If falsehood had conserved these values better, it would now be the virtue and veracity the vice. The virtues are, then, means to the conservation of values. But because they are excellent means of securing these values, they in turn become values.

The Instincts.—The instincts, "preformed methods of acting," have been formed because certain values have been of tremendous importance and in need of constant care. Each of the instincts is a method by which some value is controlled. Something very necessary to the welfare of the organism has been in danger; a good method of protecting it has been found and has been repeated so often that it has become instinctive. For instance, self-preservation (a value) may have been endangered; a good method of preserving the self was found in flight, and this was repeated until it has become instinctive in certain animals. Or, to conserve life, fighting was also found to be a good method, and it, by repetition, became instinctive.

According to Angell,[1] the instincts in man are as follows: *Fear, anger, shyness, curiosity, affection, sexual love, jealousy and envy, rivalry, sociability, sympathy, modesty* (?), *play, imitation, constructiveness, secretiveness,* and *acquisitiveness.*

As in the case of the virtues, the instincts have been so

[1] *Psychology,* p. 349.

constant and efficient as conservors of elements valuable to men, that they have themselves become valuable, and for our purposes we may speak of the instincts in both senses—both as values and as methods of controlling values.

If we think of them as values, we see at once that they are not only valuable, but that they are probably the most powerful of all motives that move man. Curiosity is so valuable that if man had not possessed it, he would never have explored his surroundings and might have been trapped and destroyed. If it were taken from man, one result would be that science would die, since curiosity is the strongest motive for scientific investigation. Sexual love is at the basis of the greatest tragedies of human existence, and is the motive for the noblest human endeavors. Sociability is so fundamentally valuable that, deprived of contact with their fellows, prisoners grow insane in solitary confinement. The old school poem voiced a psychological truth when it had Sir Alexander Selkirk say on his lonely island:

> "O Solitude, where are the charms
>   That sages have seen in thy face?
> Better dwell in the midst of alarms
>   Than reign in this horrible place."

These instincts are all worthy of high regard in spite of criticism offered against them. For instance, fear possesses value, though to be afraid is often considered to be a crime. For if a man feared nothing he might be destroyed by anything stronger than himself. Fear is considered to be a weakness only when it is produced by something that is not strong and powerful enough to justify fear.

Anger is one of the mainsprings of vigorous action. Without the capability of anger man is as helpless as a sailing vessel without wind to drive it. Instincts are to be discouraged only when uncontrolled and misdirected, and all instincts are worthy of high regard so long as they are controlled by man, or, if controlling him, so long as they guide him toward the goals of self-realization and social welfare.

Complete Living.—Spencer[1] divides values into four large classes, as follows: *first,* self-preservation; *second,* the rearing and disciplining of offspring; *third,* the maintenance of proper social and political relationships; and *fourth,* gratification of tastes and feelings. These are listed in the order of importance.

Needs—Values and needs are closely related in two ways. In the first place, as we shall show in its proper place, needs rise out of values. Food is a value; its lack produces need. Friendship is a value; its lack, likewise, produces need. On the other hand, if the ashes of Vesuvius possess no value, the lack of them produces no need. In the second place, whatever satisfies or tends to satisfy a felt need possesses value. The effort to satisfy human needs has produced the greatest masterpieces of literature, the greatest institutions of society, and the most effective instruments of industry.

Problems.—Problems and needs are, likewise, closely related. When we fail to control values, a problem arises—the problem of how to gain control. When we fail to control things of no value, we pay no attention to the failure, and no problem arises. A problem arises, then, only in connection with values, and what is a problem to one may never become a problem to another, because to him the whole situation possesses no value. But every *value over*

[1] *Education,* D. Appleton & Co., New York, 1909, pp. 13 and 14.

which we do not possess control becomes at one time or another the subject of a problem.

Interest.—Another method of grouping values is found in the term "interest." Whatever interests a person possesses value for him. Whatever possesses no value for a man will not interest him. The object of interest is a value. The child, interested in kittens, feels that they possess some value; the adult, interested in business, values the business; the woman, with an interest in embroidery, feels it to be of value.[1]

A Psychological Classification. — A classification of values which seems to be both serviceable and complete is the following: *moral, religious, social, intellectual, aesthetic, physical, emotional,* and *practical.*

According to this classification there are eight great attitudes toward life, overlapping to a certain extent, but each of importance in education. Moral values differ from religious values in that the first embraces all those situations connected with the concept of right and wrong, while the second embraces all those connected with the idea of God. The same situation for one may be merely a moral situation, for another a religious one.

By practical values is meant values that occur in our everyday, commonplace life, as well as in moments of stress and concern. Particular cases of the other seven groups of values may be practical, and are in those cases in which activity in the plane of ordinary endeavor is put forth.

Intellectual values are described by the phrase "knowl-

[1] To some readers, it may seem that the term interest, which is well known, is satisfactory for all purposes in methods of teaching and that the introduction of the term "values" is gratuitous. And it would be were it not for the fact that "values" will enable us more easily to show the place of need and problems as motives for learning, as will be shown in due time.

edge for its own sake." These are numberless. Every man has ideas, seeks facts, stores knowledge, as interesting things—frequently of little practical value, and seldom leading to social or moral action. The scientist is one predominantly biased toward intellectual values. The greatest weakness of teachers is that in practice they seem for the most part to go on the assumption that knowledge is the only value worthy of control. We do little in school to assist the pupil to control social or aesthetic values; we utilize few situations in which the emotions play a strong part; to us the school and teaching have a predominantly, if not exclusively, intellectual function.

Degrees of Value.—Values differ in degree. The sage who said, "Self-preservation is the first law of life," meant that to live is the most valuable thing in all experience. Patriots, however, who sacrifice their lives in the defense of national honor and ideals would, in making love of country the dearest principle of action, imply that for them the preservation of the nation is more valuable than the preservation of the life of any individual.

In common, prosaic, everyday experience, whenever two things to be done are present and one is chosen, the choice is due to the fact that for some reason or other one seems to be of more value than the other. Frequently neither is of great value. Both may have trifling worth and would be discarded if something of more value offered itself. For instance, routine usually has minimal value. We perform the tasks of habit without much sense of value in them. But the important point is that they possess *some* value, or they would not be performed. We sometimes say that what we do is valueless, but we must mean that its value is *trifling*, because if it had absolutely no value, it would not be done.

The degree of one value when compared with other values depends upon several factors. *First,* it may depend historically upon the age of the nation. In the sixteenth century a knowledge of the classics was much more important than it is in the twentieth century. Today social efficiency is more highly emphasized than it was one hundred years ago. *Secondly,* it depends upon national factors. In the United States intellectual ability is considered nationally to have less value than it has in Germany, while financial standing is considered much more important. A *third* factor that determines scales of value is individual temperament and taste. Certain men by temperament consider moral living to be most important, others value business success, others intellectual pursuits, still others friendship. Some men think an old coin more valuable than a marble palace. A mother may think more of the shoe of her deceased baby than of a crown of diamonds. A *fourth* factor is the age of the individual. In infancy, play, for instance, is more valuable than in maturity, while neatness, cleanliness, and courtesy are valued less highly.

Hence, taken all in all, values are multitudinous, complex and all-pervasive. They enter into every line of endeavor and determine its direction.

Subjective Values.—The reader may have felt a distinction in the foregoing discussion between two senses in which the term values has been used. It may have been felt that frequently the individual will do things that are valueless and will refuse to do things of value. For instance, the teacher may find a boy wasting his time on trifles when he should be doing important things. But to the boy the trifles are more valuable than the "important things."

Values may be subjective, felt by the individual himself, or they may be objective—that is, outside the immediate experience of the individual. And subjective values are the only basis for action, since they are present in the individual experience. The boy who is whittling a stick when he should be helping his widowed mother earn a living, whittles the stick because it is to him at that time the more valuable of the two possibilities. He has a distorted perspective of worth, to be sure, but he is acting in line with the principle. In fact, the only way to get the boy to help his mother and leave the whittling for some other day or for some other boy, is to make him feel that the other possibility is more valuable. In other words, it is necessary to make the objective value subjective. Perhaps time will produce this by its alchemy, perhaps argument, perhaps fear of his mother's scolding; but in any case the desire to help must wax and the desire to whittle must wane.

Teaching, when it is seeking for motives for action, must, therefore, concern itself with subjective values, with felt values, with values as they exist in the experience of the individual. It is concerned with objective values, with values as society judges them, only when it is seeking for direction and final ideals. But the two must not be confused.

Grading Values.—The practical question arises, as to which is the most important value and which the next in order. Is the social, the moral, the intellectual, or the practical first in order, and which is second? This we shall not attempt to settle for the reader, because there is no standard for judging. The order depends upon nationality, age, and temperament. And, moreover, the function of teaching which we have stated does not require us to make any value more important than another.

Our problem is a general one—to find methods of helping the child to appreciate and control any value or all values irrespective of relative importance. It is sufficient for us to say that there are values to be controlled and to leave the order of preference among the values to the reader.[1]

Section 3. Appreciation of Values

The purpose of teaching was stated to be to assist pupils to appreciate and control the values of life. To appreciate means to estimate properly. To appreciate the values of life means to estimate properly the values of life. This makes apparent at once one function of teaching in that it is its business to assist the pupils to judge values, or, more exactly, it means to assist the pupils to value highly the most worthy values and to place less value upon those lower in the scale of worth.

We are well acquainted with appreciation as implied in the term ideals. Good ideals are values, objectively considered. (Bad ideals may be values subjectively considered.) It is a matter of common experience that one of the functions of teaching is to build up high ideals in children. Literature is said by some to have its chief value in giving children such ideals. History and biography nourish ideals of patriotism, success, and service. Others say that the schools should inculcate ideals of accuracy, honesty, and neatness; and all of this is but another way of saying that the business of the school is to assist pupils to appreciate the values of life.

This appreciation may be of two sorts—intellectual and

[1] For arguments concerning the most important aims of modern education, see Bagley, *Educative Process*, pp. 40-65; same, *Educational Values*, pp. 107-116; O'Shea, *Education as Adjustment*, pp. 60-98; Ruediger, *Principles of Education*, pp. 102-116.

emotional. A person may *know* that honesty is a good thing, but he may not feel it in the sense that it becomes a subjective motive for the practice of honesty. We are told that "the devil can quote scripture"—a graphic illustration of the difference between the two kinds of appreciation.

As we understand it, the business of teaching is to assist pupils to appreciate in both senses, to have them know the values of life and to have them esteem, prize, and love them.

Section 4. Control of Values

It is a long day's march from appreciation to control. We appreciate the moral life, but it is difficult to gain such control of ourselves as to live the life we love. It is easy to value business success, but quite another matter to control events so as to secure success. It is a well-known truism that none of us reach our ideals; that is, we do not gain control of the things we set for ourselves as worthy of effort.

It can be stated as a fact of general application that no man controls all his values. The range of interests may be wide, their intensity high, the most strenuous effort may be put forth, but in the end a great gap exists. However, men can secure better control if they know how. And herein lies the business of teaching—to assist pupils to get control of values, to show them how to reach their ideals. If the child has a capability for æsthetic enjoyment, he should be helped to secure it; if he wishes to be of service to society, he should be shown how *to be* of social service; and if he desires to live a spiritual life, he should be assisted to gain *skill* to live it.

Some methods of control have been worked out by the race and stored in books; others are handed down by oral tradition; other methods are in constant practical use as tools and instruments. Some the race has not yet worked out.

Section 5. Assistance of Pupils

The problem of assisting pupils depends for solution upon two factors: *First,* it is necessary to determine as carefully as possible (1) the ways in which the child mind acts in securing control, and (2) the subjective values that are resident in children. This is necessary in order to get a starting point in teaching and to develop methods of presentation. For, obviously, the more nearly we ascertain the content of the child's mind and his methods of working, the less waste will be necessary in teaching. *Second,* we must know what values are most highly appreciated by society and what methods of control it has worked out through the ages, so that we can interpret and guide the child, thus making him efficient by having him adopt values and methods of control that the race is already using.[1]

Problems Outlined.—In analyzing the process of teaching from the point of view described in this chapter, we shall discuss four leading topics:

1. *Subject-matter;* i. e., the methods of control that the race and the child have worked out.

2. *Motive;* the "motors" that generate and direct activity along specific and intended lines.

3. *Development;* the methods by which the child gets control of values and increases or changes his appreciation of them.

4. *Use* of subject-matter, once control has been developed.

[1] Dewey, *The Child and the Curriculum,* pp. 14-18.

References for Class Reading

Bagley, *Educational Values,* pp. 107-116.
O'Shea, *Education as Adjustment,* pp. 60-98.
Ruediger, *Principles of Education,* pp. 102-116.

Exercises

1. Collect the aims of education as found in the index of Monroe's *History of Education* under the caption "Aims of Education." Show that each is a value. Show also that some of them were good aims for the age in which they were formulated.

2. What is in your opinion the most important aim of education for this generation? State others that are secondary and justify your choice of the most important.

3. What values do each of the virtues quoted from Hyde assist us to control?

4. What values do each of the instincts quoted from Angell assist us to control?

5. Give five examples of valuable methods of satisfying needs; five of valuable solutions of problems.

6. Name the five most valuable interests in your own experience; in the experience of a twelve-year-old boy of your acquaintance; in the experience of a twelve-year-old girl of your acquaintance.

7. Give three illustrations demonstrating that routine possesses *some* felt value, if it is performed at all.

8. Give five examples showing the distinction between subjective values and objective values, and state how you might make these objective values subjective.

9. Give five examples showing the distinction between knowing about a value and feeling the value.

10. Give five examples of values you appreciate but cannot control.

11. Give five examples of individuals whose lives have been dominated by some one value or closely coherent group of values. Outline the histories of the lives, noting what each did to control his value.

CHAPTER II

SUBJECT-MATTER[1]

In pedagogical literature no adequate expression of the exact place of subject-matter in the teaching process has been given. To the writer, the function of teaching stated above (the assisting of pupils to appreciate and control the values of life), seems to give it a definite and useful place in a system of methods of teaching. In endeavoring to show this place, the following topics will be discussed: (1) the origin of subject-matter, (2) a definition of subject-matter, and (3) pedagogical applications.

Section 1. Conditions under which Subject-Matter Originates

New subject-matter is formed when difficulties which cannot be handled by subject-matter already formed, are met. Or, in other words, it is created in response to some need.

This holds true of the ancient first beginnings of subject-matter. For instance, it is commonly held that botany had its early beginning in sickness and disease, for whose cure the tribal women collected herbs and studied them. The science of chemistry sprang from alchemy through the desire of men to find a rapid means of changing the baser metals into gold. When the Nile swept away the "line

[1] It is suggested that a reader, reading this text for the first time, read Chapter 8 and following chapters before reading Chapters 2-7. These latter were for logical reasons inserted where they are, but the easiest order in which to read them is that just specified.

fences" of the ancient Egyptians every year, geometry was invented to determine the boundaries of sections of land. Astronomy in the form of astrology, probably, began in an effort to foretell disasters and good fortune.

School Subjects.—Not only did subject-matter begin in ancient times when a need for it was felt, but today new subject-matter is created under similar conditions. For instance, all school subjects begin in this manner. Systems of bookkeeping are originated when business grows so large that a systematic record of transactions must be kept, or when, if not kept, confusion results. Writing originates when people are separated and cannot keep in touch with each other, or when one with a poor memory finds that something he wished to use has been forgotten. New styles of writing are originated when old styles prove inadequate. The reader is undoubtedly able to remember how vigorous criticism against the Spencerian system gave rise to vertical writing and how later criticism of vertical writing gave rise to the semi-slant and other forms. Manual training originated in the schools because it was felt by some that the motor training of pupils was being neglected, and by others that pupils were not receiving a training for industrial life.

Facts.—Facts within subjects originate in like manner. As we use a subject we find places in which it does not work. This sets us to improving it—that is, it sets us to finding new subject-matter. The little child's first sentence is a single word—"Daddy," "hat," "hurt." But when the mother says "What hurts?" the child says "Finger hurts," because the single word "hurt" is inadequate. Thus he re-invents the subject and predicate. Again, when the child says "Kiss finger" and the mother kisses her own finger, the baby says "Kiss baby's finger," and the adjective idea is utilized by the child because the failure to use the adjective does not bring the coveted satisfaction. Tense forms, case, number, comparison of adjectives, all grammatical forms with few exceptions were and are differentiated under the stimulus of *inability* to otherwise secure exactness in communication.

In all these cases it can be easily seen that some need, or problem, some breakdown or difficulty, set men to work creating new subject-matters. In other words, if one is not satisfied with the methods by which a thing of value is controlled, a new method is attempted.

No Dissatisfaction, No Subject-Matter.—On the negative side, new subject-matter will not originate if there is no dissatisfaction, problem, or need. As long as accounts can be kept in one's head, there will be no system of bookkeeping. If people are not separated they will not write to each other. If old styles of writing are satisfactory no new style will be invented. If motor training is taken care of manual training need not be introduced. If people had not grown sick there would have been no study of herbs for the purpose of cure. If men had not wanted to make money quickly, alchemy might not have been begun. If future events had been known, there would have been no astrology.

We might have had botany, chemistry, or astronomy originated for other purposes; but whatever the purpose, it would have originated because of *some* need, problem, or difficulty, and if there had been none such, there would have been no subject-matter.

Old and New Subject-Matter.—If we have never experienced the need, problem, or difficulty before, we make new subject-matter to handle the situation. Every new difficulty requires a new way of meeting it; every new problem requires a new solution; and every new need requires new methods of satisfaction. The aeroplane is a new way of handling a hitherto unsolved problem; the paper clip is a new way of satisfying a need not previously satisfied so well; the Interstate Commerce Commission is a modern method of handling difficulties arising from monopolistic avarice.

If the need, problem, or difficulty is new to us, but has been successfully coped with by others, we may accept the subject-matter which they have provided, as when to get light we turn a switch, to get butter we visit the grocer, or to cure a disease we call the doctor.

If the need, problem, or difficulty has arisen at an earlier time in our own experience and has been controlled by us before, we use the same subject-matter as on the earlier occasion. If we meet it frequently the subject-matter becomes a habit; if the race has handled it from the beginning it becomes instinct and reflex.

But in all these cases the important point is that new subject-matter is not created or old subject-matter used again except after some need, problem, or difficulty has arisen.

A few examples will make this clear. For instance, in a primary cooking lesson there arises a necessity for rather definite measurements. Thus a need for arithmetic is felt which cannot be satisfied in cooking and is carried over to the arithmetic class, where the pupils discover the new way of acting. Now, of course, the race had worked out an arithmetical system a long time ago, but to these little children arithmetic is as novel as if it were an original discovery. That the race had already worked it out for them is merely a lucky accident. A boy learns local geography by searching for a bee-tree, a bird's nest, or a swimming-hole. Somebody has told him there is one. He wants to find it but has no definite directions. He feels the need for such directions and proceeds to get them for himself by inquiry, by discovery, or by a combination of both.

It is unfortunate that the typical school of modern times designates definitely what subject-matter is to be studied on the basis of what will be of use in later life and leaves the teacher to his own devices in creating real and often, of necessity, fictitious needs for it in the pupils' minds. It is to be hoped that the few experiments now being carried on, mention of which is made later in the text, will so spread in influence that the typical school taught by the average teacher will be changed in its point of view and begin with the immediate, active and potential needs of the children. For the present, however, the individual teacher in the typical system has to do his best to apply the principles to the order of things as they are, while hoping, by a process of evolution, to bring about a change to the other point of view.

Section 2. Subject-Matter and Action

Subject-Matter, Not Books.—Books and subject-matter are not synonymous; for the extent of subject-matter cannot be compressed into the proportions of a text. So vast is it that to catalogue the subject-matter of one five-year-old fraction of humanity would consume a five-foot shelf of quarto volumes. To record all subject-matter of all peoples in books would be as hopeless as to empty the ocean with a bowl. This anyone can see for himself by recalling that what he writes is but a meager outline of all that he has thought of while writing; that he writes seldom; and that only an infinitesimal fraction of the people of the world put upon paper the smallest fraction of what they think, feel, and do.

A book is written by one who wishes to convey his subject-matter to his readers, and thus it is, strictly speaking, a set of symbols which has no meaning apart from his experience and theirs. It merely describes, relates, or explains it, but is subject-matter in no essential sense. Like all records, a book is lifeless, inert and useless, except as a guide or stimulus to the formation of subject-matter.

Subject-Matter Is Mental.—To find subject-matter we have to look into the experiences of individuals. History is contained in the minds of people. Records and monuments of history are found scattered over the landscape and in libraries, but they are not history. They are guides for people who see, interpret, and use them to build up within themselves images of the events they stand for. Botany is mental. A plant by itself apart from human beings would not be botany. The contact of human beings with plants is absolutely necessary in order that there be a science of botany. Geography is also resident within individuals. Books on geography are merely aids which assist pupils to build up the subject-matter of geography inside themselves. Little Jack Horner's experiences *live* only in people. Outside of people, all that we can find are some letters and pictures which in themselves are dead, the mere material incantations by which the famous pie-eater may be brought to life in the mind of every reader. Shakespeare's tragedies live in people. The plays of Shakespeare can only in the crudest sense be said to be found in books. Once upon a time they lived in the experience of the author, who put certain signs on paper, the records of his feelings, so that other individuals using these signs and records might interpret them, and to a greater or less degree re-live the experience of the writer, re-experience the tragedies and bring them to life again.

Pedagogical Application.—Books can be seen and their information can be made definite, but the content of pupils' minds is *elusive* and shut in behind docile muscular actions. Therefore, it is easy for the teacher to know books, but hard for him to know pupils. When he teaches geography he may mean that he is teaching the text-book. But so far as the triangle of text, teacher, and pupil is concerned, geography lives only in the teacher and the pupil, and the text is a convenient guide for directing the life of geography inside.

It is a prime essential, therefore, that when pupils are taught, this fact be kept always in mind. And therefrom it will follow that the teacher must keep his mental eye upon the state of the subject-matter in the pupil's mind. He must watch it grow and upon the basis of that growth, rather than upon the number of pages covered, judge the progress of his work.

A teacher who, before beginning a subject or a topic, takes the time to tabulate how much the pupils know and feel about it, and how much they can do with it before beginning to study it, will save time. This was brought home to me in an interesting way by a superintendent of wide experience and good professional training, who stated that when he began his systematic addition work in the lower grades, after considerable incidental work he used no objects, merely putting on the board simple problems in addition, as

$$\begin{array}{ccc} 7 & 6 & 5 \\ 1 & 3 & 4 \\ \hline \end{array}$$

He had reverted to the old methods of our forefathers.

At first thought it seemed that he was a reactionary, but on second thought he seems to be progressive, because, as he explained, every eight-year-old boy in the small towns of the Middle West knows enough about small numbers to do without the objects in using them. Yet, if one did not observe pupils he might keep extravagantly inadequate ideas about the infantile powerlessness of pupils in school and waste time and energy in teaching what the children already have.

On the other hand, a canvass of what the pupils know about subjects saves time by showing how little they sometimes have. This is well brought out by a series of questions asked of a class about to begin the study of physical geography in the high school. They had previously studied elementary geography, but out of 41 pupils answering, 16 did not have any clear idea of longitude; 9 did not know where water vapor comes from; 9 did not know which is the east side of the map; 21 thought the sun goes on the other side of the earth at night; 19 did not know what is meant by the axis of the earth, one stating that it is the imaginary frame upon which the earth turns; 10 did not know of what coal is made; 13 did not know that thunder and lightning occur together, one of these believing that "thunder comes before lightning as a warning, for the lightning does the harm"; and 29 knew of no relationship between the tides and the moon.

Time is, therefore, saved and, in addition, as will be shown in its proper place, the laws of apperception will be obeyed to the benefit of the teaching process by as close and careful examination of the state of the subject in the pupils' minds as the difficulties of the problem will permit.

Ways of Acting.—This subject-matter in people is, in the last analysis, *a way of acting*. Every person is all the time seeking to control values. But in order to control them some sort of action is necessary, and this action is subject-matter. Bluntly speaking, this means that geography and history, arithmetic, literature, art, and physics are ways of acting. The following observations will make clear the seemingly far-fetched connection between subject-matter and action.

(1) Action includes more than muscular action. It includes all phases of experience. Physical activity is one form, intellectual activity is another form. Morality and religion are, also, activities. Emotion is another form. There are, also, æsthetic and social forms of activity. Experience and consciousness are essentially forms of activity.

Subject-matter as a way of acting may thus be analyzed so as to be called a way of thinking, of feeling, and of acting with the body. And this helps to make the idea clearer because it is easy to see that geography is a way of thinking about the earth's surface. *Crossing the Bar* is a way of feeling and thinking about death. The *Ten Commandments* are ways of governing our moral actions. Social customs are methods of acting toward other people, of feeling toward them or of thinking about them.

(2) Living organisms are constantly endeavoring to adjust themselves to their environment, and to a greater or less degree to adjust their environment to meet their needs.[1] Houses, clothes, cooking, milling, railroads, carpentry, writing, matches, and carriages are all methods of adjustment. In fact, everything done by men, is done in order to make adjustment more complete.

These methods of adjustment constitute subject-matter.

[1] O'Shea, *Education as Adjustment*, pp. 76-98.

It consists in the ways of thinking, feeling, and acting that are worked out in the attempt to make appropriate adjustments. In getting control of the place of things man has worked out geography; to handle quantity he has worked out arithmetic; to control force he has developed physics, and to control beauty in his environment he has developed art.

(3) Among animals and infants, control is largely muscular. But as intellectual development occurs, the child works out his controls with increasing assistance from the intellect, and adds to his list of primitive values the more subtle and refined values of the civilization by which he is saturated. Ideas, facts, principles come to his assistance and control of values becomes a much more comprehensive thing than the earlier muscular control of infancy.

Children's Meanings.—Yet, up to a relatively late date in childhood, ideas are still surcharged with muscular activity. This is brought out in an interesting way by the following oft-quoted illustration secured from another source by Chamberlain.

A boy ten years of age gave the following definitions, which, it will be observed, are nearly all in terms of action:

Kiss is if you hug and kiss somebody.
Mast is what holds the sail up top of a ship.
Milk is something like cream.
Nail is something to put things together.
Nut is something with a shell good to eat.
Open is if the door is not closed.
Opera is a house where you see men and ladies act.
Pickle is something green to eat.
Quarrel is if you began a little fight.

Ring is what you wear on your finger.

Saw is if you see something, after you see it you saw it.

Vain is if you always look in the glass.[1]

When children grow older they work in the field of non-muscular activity to a greater extent. But, even so, they are still acting, constantly making adjustments and controlling values. In doing this, they need and use all kinds of subject-matter and the important principle to be constantly utilized is that subject-matter essentially consists in ways of acting worked out by some one and utilized by the children. To assist in applying and utilizing this principle the following illustrations may be of service.

Illustrations from Literature.—Tennyson's *Crossing the Bar* is a way of thinking and feeling about death. With this may be contrasted another way as presented to us in Browning's *Prospice;* or, still another, that portrayed by Bryant in *An Old Man's Funeral. The Lord's Prayer* is a way of expressing veneration and worship for a loving but all powerful God. *Now I Lay Me Down to Sleep* is a method of asking in simple language for the care of God through the night. *Excelsior* is a way of viewing unconquerable aspirations. *Macbeth* is a way of thinking and feeling about the progress of unfettered ambition. *Hamlet* is a way of thinking and feeling about a life of indecision. *Job* is a way of thinking and feeling about the significance of suffering. Every unit of poetry or prose is a way of thinking, feeling, or acting about something.

Illustrations from Arithmetic.—Multiplication is a short way of adding, as division is a short way of subtracting. Promissory notes are methods or ways of keep-

[1] Chamberlain, *The Child: A Study in the Evolution of Man,* pp. 146-7, quoting from Wolff, *Boy's Dictionary.*

ing permanent records of loans, and receipts are ways of keeping permanent records of commodities delivered. Common or decimal fractions are different ways of handling units smaller than the whole. Multiplication tables are ways of making easy the learning of facts of multiplication. Denominate numbers are ways of handling concrete measures. Percentage is a way of handling quantities upon a basis of 100, and the decimal system is one more or less convenient way of recording quantity. So, also, we see that every arithmetical process is a *way of acting*.

Illustrations from Sociology.—It may seem that an institution is not a way of acting. But to show that it may be viewed in that light let us consider some examples. In Presbyterianism, for instance, we have without question a very definite way of acting. Two hundred and fifty years ago the supporters of Presbyterianism thought their religious thoughts and lived their religious lives after a fashion more or less peculiar to themselves. These thoughts and principles of living they put at that time into the form of a creed, which is essentially a handy device by which to teach Presbyterians how to think and act upon certain matters. Again, the republican form of government is one way in which a group of people may act in governmental matters. The Constitution of the United States was formulated so that the people might know how they should act in certain situations. Courts have been established to interpret these rules, and to advise individuals when doubt arises as to whether they have or have not acted according to the rules laid down.

Illustrations from Psychology.—An instinct is a way of acting which is bequeathed to the individual at his birth. A habit is a way of acting which the individual has worked out for himself and retains. Memory is a way in which the intellect acts in situations similar to others previously acted upon. Reasoning is a way in which the intellect acts in the presence of circumstances requiring a new organization of experience. Emotion is not only a form of mental action but also a mode of organic action.

Pedagogical Applications.—Subject-matter is not something to be stored in the mind. It must be turned over into action, with the purpose of modifying conduct. Useless subject-matter clogs the stream of life, it litters the workshops of experience, it is nauseating to pupils, and degenerates educational practice. Among the many things that may be taught only those should be taught which will be of importance in solving the problems and satisfying the real needs of pupils.

To make the point of view of the text more emphatic at the outset, a few reiterations of the conditions under which subject-matter originates in the minds of pupils must be made. *Crossing the Bar* will be of little use for study till pupils have felt the problem underlying it. At an earlier time it is so much "emotional Greek." Bryant's *The Planting of the Apple Tree,* Tennyson's *The Brook,* Alice Cary's *True Worth Is In Being, Not Seeming,* are all perpetrated on nine-year-old boys and girls in a prominent state course of study. Much of the miscalled children's poetry is useless to children, for the feelings it expresses are often those of an adult, and the only claim it has to the name of children's poetry is that it is about children. Field's *Little Boy Blue* is of this sort, and if I were sure of protection from violence, I would suggest that *The Children's Hour* and *The Village Blacksmith* are not suitable for ten-year-old girls and boys.

The multiplication tables should come in only after expert use of addition because when the pupils have become experts in adding they will appreciate short cuts. Here again many schools make a mistake in beginning systematic arithmetic in the first grade. It should be left until the beginning of the fourth grade. Previous to that time it will take care of itself, incidentally in connection with the hand work of the three first grades. But in the fourth grade the pupils are old enough to feel a need for systematic addition. And instead of teaching all the operations together we should revert to the plan of the old arithmetic in giving addition first, to be followed by subtraction or multiplication. By this method the pupils will be able to see the purpose of multiplication in shortening addition. Denominate numbers can be introduced through the need for them only in occupational work which makes their use necessary. And as the schools learn to do more and more of this work the teaching of arithmetic will become more and more efficient, since the purposes of the operations will be made evident.

The same is true of tools. We learn to use the hammer when we need to drive nails. We learn the signs on the face of the clock when we feel the need of telling time. Children in school can learn much of this, incidentally, if when a clock is kept in the room the little folk are told to let the teacher know when their class should begin or when recess begins or is over. This will form an excellent situation in which the Roman numerals, and counting by fives to sixty, can be taught under the stimulus of a strong motive. An inkstand is made, purchased or acquired by children when they find that their fingers get dirty as the pen runs up and down the ink-bottle neck, or when some other disability occurs. A habit is not broken until it is found to be unsatisfactory. A habit is formed when the need for an action occurs again and again. Children reason when habit will not handle a case.

In every case "new" subject-matter is taken on normally by the child when he feels a need for it. To teach it when the specific need for it is not felt may produce some good, but is highly wasteful and inefficient.

Exercises

1. State in a general way the origin of printing, of fly-paper, the school, Tungsten electric light bulbs, drilled wells, anti-toxins, furnaces for houses, concrete sidewalks, rebating by railroads, mail order houses, refrigerators.

2. Make a list of ten kitchen utensils and state what need they satisfy. State what would be the difficulties in kitchen work if these were not used.

3. Give ten illustrations showing that when people feel no dissatisfaction with old things they will not take on innovations.

4. What is the difference between the conservative and the progressive type of mind?

5. Is it possible for any two people to have exactly the same geography subject-matter? Why?

6. Take a child of six years of age who has not yet entered school and try to catalogue all he knows about arithmetic. Test his knowledge of counting; give concrete problems to find how much he can add and subtract, multiply and divide, and what he knows of positions and denominate numbers.

7. Work out in class a series of tests to determine what a class beginning algebra can do with the arithmetical processes involved in the subject. Test for speed and accuracy, for drill work and thinking.

8. Work out in class tests for determining how much an elementary school class beginning the systematic study of American or English history for the first time knows about the chief characters in the subject. Find out in this connection what of this has been taken up as a part of the school course in the earlier grades.

9. Show that the following are ways of thinking, feeling, and physical action: *Politeness, religion, the appreciation of a beautiful picture or melody, love for one's mother, meeting a friend in a strange city, Latin verbs.*

CHAPTER III

DISTINCTIONS IN THE MEANING OF FUNCTION

SECTION I. INTRODUCTORY

The function of subject-matter has been implied in the discussion of the first and second sections of the foregoing chapter. Subject-matter originates when some need, problem, dissatisfaction or difficulty occurs. It is a way of acting in the attempt to satisfy needs, solve problems, remove dissatisfactions and overcome difficulties. Its function, then, is to solve problems, satisfy needs and overcome difficulties. Or, in terms of the function of teaching, we may say that its function is to give us appreciation and control of values. For, when we fail to control values, a problem or need arises, and subject-matter, by solving the problem or satisfying the need, gives us the desired control.

However, text-books on the teaching of subjects do not always apply this principle with clear-cut definiteness. For, as we shall see, much of present teaching is dominated by the principle of formal discipline, and little attention is paid directly to the specific problems and needs which each unit of subject-matter is supposed to control.

Certain distinctions will be made in the current inexact use of the conception of function. For this purpose two typical examples will be taken from current texts wherein the function of subject-matter is discussed under the term "value of subject-matter." Bourne in his text-book on

The Teaching of History[1] gives the following as the values or function of history:

1. It interprets the world to the child.
2. It can make a direct appeal to interests which the pupil already possesses.
3. It has a moral value.
4. It should help to produce an enlightened patriotism.
5. It develops a love of truth, judgment, imagination and historical-mindedness.
6. It brings added pleasure within the reach of the pupil—pleasure in the study of history as history.

Smith, in *The Teaching of Chemistry and Physics,* gives the following as reasons for studying science:

1. It trains in observation, comparison and induction, in imagination, and in self-elimination.
2. Its information possesses value.

Section 2. Intrinsic and Indirect Functions

Subject-matter is used by the race and by the school. Presumably it would be used by the people whether there were schools or not; for schools are of recent development and subject-matter has been in use since the beginning. The school uses the methods the race has worked out for solving its problems, but, in addition, it sees in the operations of education an opportunity for controlling, by the use of subject-matter, a number of problems that the race does not have in mind. As Smith says, science "trains in observation, comparison and induction, in imagination, and in self-elimination." But, obviously, science was not created and is not used in racial economy outside of school—is not, in short, studied by scientists—for any such

[1] Pp. 77-92.

[2] Smith & Hall, *The Teaching of Chemistry and Physics,* pp. 9-15.

purpose. No scientist will spend years on his subject in order to train his imagination, or his powers of induction and comparison. He has something more vital to occupy his attention—the solution of certain problems of the science. As a result of his study he may indirectly secure training in these powers; but his mind is on his problems.

Subject-matter has both a primitive and a modern function. In other words, it may have been created for one purpose and be now used for another purpose. Botany, chemistry, astronomy, geometry, are a few examples of subjects whose function has changed between primitive and modern times. But in the main the function of subject-matter has remained the same, the chief differences being those of detail. For school purposes the modern function is the important one, and the primitive function is chiefly of historical value. Teachers are concerned with teaching children the uses made of subject-matter by the generation in which they are being educated.

The Intrinsic Function of Subject-Matter.—These two ideas are expressed by the term "intrinsic function of subject-matter," which may be defined as *the function which subject-matter serves in racial economy without respect to the purposes of the school.* As illustrations of this intrinsic function, the discussions in the preceding chapter are to the point, and further illustrations may be found throughout the succeeding chapters wherever function is implied or discussed.

In the lists of values given by Smith for science, the second—that of affording information of value—is a statement of the intrinsic function, though a very indefinite and useless one, since it does not define the information that science gives, the function stated holding equally for any subject, since it is presumed that all subjects provide information of value.

In Bourne's list, the sixth—that of providing pleasure in the study of history as history, or the first—that of interpreting the world to the child, are probably the intrinsic functions from his point of view, though by some writers objections are made to the second conception of the function of history. As a matter of fact, neither of the writers has stated the specific functions of his subject with sufficient clearness to differentiate it from others.

Intrinsic Function, Specific.—In this connection it is well to emphasize a law, subject to few exceptions, that each unit of subject-matter has an intrinsic function differing from that of every other unit. This depends upon the principle of economy of effort, from which it follows that if one way of satisfying the need has been found to work with perfect satisfaction, people do not search for other ways. Sometimes, when one method is not perfectly satisfactory, another method, an improvement, may be invented. Again, it happens occasionally that different races and different persons widely separated work out different methods of satisfying the same needs, and, occasionally, both of these are handed down to posterity side by side. For instance, the Romans used one sort of numeral, the Arabs another, and the Anglo-Saxons have inherited both. But for the most part each unit has a different function. And, without exception, this holds true for the great divisions of subject-matter such as are taught in school. History solves certain problems in a certain way. Physics solves certain problems in its own way. Language solves certain problems in ways peculiar to itself. Wherefore, it is the business of teaching to determine what is the specific intrinsic purpose of each unit used in the educative process.

The Indirect Function of Subject-Matter.—When we consider the place of subject-matter in relation to the education of pupils, certain new and confusing functions of subject-matter develop. Ask a group of teachers about the value of algebra to high school boys, and they will tell you that it develops exactness, trains the logical powers, provides a good discipline, and prepares students for university work. This answer is more or less correct, for algebra does possess all these values. But none of them is the intrinsic function of algebra, since algebra cannot conceivably have been created, nor is it now used by the race outside of school, for any such purpose. Its intrinsic function is something different, and will be discussed in its proper place.

The values which Bourne and Smith give for history and science, and the values of algebra just stated, are actual and forceful. But the important fact to be remembered about them is that they are *by-products* which are secured while the intrinsic function is being fulfilled. When pupils work out the intrinsic problems of algebra, it is found that they grow in logical power, and are getting ready for college. When pupils are solving the problems of science, at the same time *without thinking much about it,* they grow in power of judgment, comparison, induction, and so forth. The problems of the subject are in the focus of attention, and after attending for a long time, we find, when we take stock, that other values have been constantly accruing.

These values which accrue as by-products while the intrinsic function is being operated may be called "indirect functions" of subject-matter.

Unfortunately for the pupils, teachers confuse these two sets of functions, the intrinsic and the indirect, when they think about the value of the subjects taught. It is unfortunate because pupils frequently do not care much about logical training and preparation for life, for duty and neatness. Because the studies possess little subjective value, the teacher encounters a world of difficulty in getting children interested in them. This would be obviated if each unit of subject-matter were tested out by the teacher to find its intrinsic function and the need it satisfies, and if an effort were made to correlate it with the appropriate need found in the pupil's experience.

Classes of Indirect Functions.—Of these indirect functions there are at least three.[1] *First,* the *disciplinary* function, the training of the mental powers, such as memory, imagination, reasoning, habits of neatness, etc. From this function, much of the basis for its claim to recognition has been removed by recent investigations into the facts regarding formal discipline. *Second,* the *preparatory* functions which belong to certain subjects. For instance, algebra, while concerned intrinsically with other matters, has an indirect advantage, in that it is a preparation for higher mathematics. The *third* class includes those *decorative* functions which consist in a mere acquaintance with certain subjects. A knowledge of historical names and events, a reasonable ability to speak correct English, some acquaintance with literary characters, all have a value which is evident in a negative way at least, in the social criticism to which one not possessing them is exposed.

Section 3. Function for the Author, Teacher and Pupil

These distinctions may be approached from another point of view. We may look upon any unit of subject-matter from three standpoints:

[1] Bagley, *Educative Process,* pp. 230-2.

First, we may consider the problem which the author wished to solve when he wrote. For instance, Longfellow tells us that his purpose in writing *Excelsior* was to "display in a series of pictures the life of a man of genius, resisting all temptations, laying aside all fears, heedless of all warnings, and pressing right on to accomplish his purpose."[1] This we may call the intrinsic function the author intended the poem to serve.

Second, the function of the poem from the standpoint of the *teacher* should, of course, include the intrinsic function which the author had in mind. But, in addition, the teacher may have other purposes which he intends it to serve. For instance, he may have in his classes some ambitionless boys upon whom he wishes it to act as a spur. Or, he may wish to use it as a means of giving his pupils a training in literary interpretation. Now, these are the indirect values that flow from a study of the poem and may not have been thought of by the author at all. In this case, certainly Longfellow did not state that he intended the poem to be a spur to anybody, nor to give a training in literary interpretation. He says specifically that his purpose was to "display the life of a man of genius," not to present a moral or critical treatise. Hence, we see that the teacher's view of the function must include the author's, but may include many other functions besides.

Third, the function of the subject-matter may be considered from the student's point of view. When we consider what he is *consciously* working for, we find at once that he may not see as the function of the unit all those purposes which the teacher expects it to serve in his education. For instance, he may not be aware of the fact that

[1] *Longfellow's Poetical Works,* Vol. 1, p. 79 (Houghton, Mifflin & Co., 1892 edition).

the teacher guilefully presents *Excelsior* in the hope that it will spur him on to action, and he may not know that the teacher intends the study of the poem to give him greater powers of interpretation. Of course, on the other hand, he may be conscious of the teacher's intention, and he may consciously strive for this greater power which the teacher wishes him to have. But the point is that to the student the purpose of the poem *need* not be, and usually is not, as broad as it is to the teacher.

When we consider the relation of the pupil's view of the function to that of the author, two facts are in evidence. In the *first* place, the pupil's view may not be the same as that of the author. For instance, he may not see in the poem under discussion that there is "displayed the life of a man of genius." The poem may be for him only the adventures of a very strange sort of boy. He may not be able to look behind the story to find the meaning which the author intended. But, in the *second* place (to lay down a principle which, while allowing for numerous exceptions, is generally applicable), the function of any unit as the author intended it and as the pupil uses it should be as nearly as possible identical. For, if each unit is a tool constructed for a specific purpose, then the pupil will, as a general thing, get the most good from using it for that specific purpose. A razor will usually do its best work when it is used as an instrument for shaving; the tragedy of *Macbeth* will exert its influence to the fullest degree when the function it serves in the life of the reader is that for which Shakespeare created it.

The teacher's, the author's, and the pupil's views of the function of subject-matter may be compared and contrasted as follows: The teacher's idea of the purpose of a unit must include both the author's and the pupil's, whether these latter agree or not. It may include also certain other indirect functions of which neither the pupil nor the author is conscious. The author's and the pupil's views of the function are in the main identical; for in both the intrinsic function is uppermost. Where a discrepancy between them exists, either the author's or the pupil's point of view may determine for the teacher what is *the* intrinsic function, and which shall do so depends upon circumstances. If we are anxious to find out what the author was trying to say, then his purpose is the intrinsic function; but if we are looking for something to adopt and utilize in solving some problem of the pupil, the function of the author becomes secondary in importance, and the pupil's view becomes *the* intrinsic function.

Advantages of These Distinctions.—*First,* they make possible a separate disposition of the functions which subject-matter serves. For instance, the teacher should, in beginning to teach any subject to a class, consider *all* the values that may be controlled through a study of the subject—such things as thoroughness, honesty, neatness, and discipline of memory and imagination should be considered, and those selected which are most relevant in the particular conditions in which he finds himself. Then, from day to day, as each unit of subject-matter is taught, such of these as need special attention should be noted. In addition to this, the specific intrinsic function of each unit should be determined. But the indirect purposes should form the background of the stage. The specific intrinsic function should be in the foreground of the stage, the thing upon which the teacher attempts to center the conscious efforts of the children.

Second, if these indirect results are by-products, it is evident that the attention of the pupils should, for the major part of the time, be directed upon the intrinsic functions of subject-matter. Most attention is given by pupils in arithmetic to measuring quantities, which is the intrinsic purpose of arithmetic, and less conscious attention is given to training powers of accuracy. More of the pupil's attention will be given to communicating things of value in language, and less to the written forms. In history, the greater part of the pupil's attention should be placed upon the solving of the problems of the race in continuous series from their ancient to their modern forms, while a smaller amount should be placed upon the training of memory, imagination, and so forth.

Third, the indirect functions of subject-matter may, as we saw in Chapter II, serve as aids in the solving of our conscious problems. For instance, no process in arithmetic will really fulfill its intrinsic function adequately unless accuracy is used. Hence, accuracy is not only a by-product; it is also an aid. It is a by-product which is so closely related to the central process that the central process cannot get along without it. This is true in the case of most of the indirect values.

By virtue of this close relationship we are able to state the conditions under which the indirect values should be given a place in the focus of attention of the pupils—viz., when the pupils' failure to *adequately* carry out the intrinsic function of the subject-matter is imminent or has occurred. For instance, when it seems likely that they will not be able to get the correct result in measuring, or when it is already evident that they cannot, because of inaccuracy, then accuracy should be brought to the focus of attention for the time being. That is to say, attention should be paid to the indirect functions of subject-matter when the direct ones have broken down or are on the verge of doing so.

Fourth, these distinctions enable us to draw a clear line of demarcation between the needs that children feel and the needs which the teacher feels that they have. It is one thing for the teacher to feel that a boy needs punishment; it is a quite different thing for the boy to feel that he needs it. It is one thing for the teacher to feel that the pupil needs history in order to make him a good citizen; it is quite another thing for the pupil to feel that he has this need. Yet, no matter what purpose the teacher has in view, the function which the subject-matter will perform in the work of the school is dependent also upon how the pupil feels about it.

Of the two, the child's *conscious* need must be the starting point of the school process. If the teacher is to have the child's estimate of his own needs become identical with the teacher's estimate of them—and this latter, in the main, makes for the greater social efficiency—he must *develop* those needs which the child does feel until they grow into the form of those which the teacher, as the wiser individual, feels and appreciates.

Fifth, we see, also, that, *on the whole,* those units of subject-matter of which the child cannot appreciate the intrinsic function as judged from the author's standpoint, ought not to be forced upon the pupil before the relevant needs are present. Why give him subject-matter for which he has no apparent use? It may abide for a time in memory as so much foreign material, seldom to be assimilated, probably soon to be lost.

Sixth, these distinctions further lead us to see the futility of trying to follow a text-book slavishly. The author may not have had the problems of any *real* pupils in mind, or he may have built it for his own pupils, from whom other pupils may differ. And, again, different classes which the same author may teach have different needs and problems arising in a different order from year to year, so that he himself, if he is a good teacher, cannot slavishly follow his own text. Hence, if we are to follow the conscious needs of the children, and thus introduce subject-matter whose intrinsic function is to satisfy felt needs, we must follow the lead of the pupils and not that of the order of the text-book, unless the two run side by side.

Finally, these distinctions require the teacher to scrutinize *every* unit of subject-matter to see what is its intrinsic specific function; for otherwise it may not be usable in the situation for which it was intended. It is not sufficient to consider merely that a shovel and a fork both develop muscle. Of much more importance is it to know, in addition, that for which each of these instruments is especially useful. If only muscular training were involved, there would be no harm in pitching hay with the shovel. Perhaps such exercise would be strongly conducive to muscular development. And yet it would not be very sensible in practical life.

The teacher should realize the folly of saying, for example, that for his purpose in class the function of *Hamlet* is to train the imagination, or to create a love for good literature. In that case, the purpose of *Hamlet* is not different from that of a hundred other poems. But when we say that the specific intrinsic function of the play is "to show the dissolution of an indecisive character," then *Hamlet* stands by itself distinct from all other poems. The student turns to it for enlightenment concerning the question of indecision of character. That should be the central theme of the recitation, the one upon elucidation of which the most of the attention should be centered.

Section 4. Subject-Matter as End and as Means

Efforts to clarify the meaning of function meet with difficulties of another sort.

The question, Why study algebra, history or physics? is answered by some by saying that each is worth while for its own sake. The scientist thinks the problems of his subject are worth solving as scientific facts, worth as much in themselves as are any other problems. The historian studies history to know history, and the mathematician takes delight in an abstruse problem in his own field, just for the sake of solving it. This is called the attitude of the specialist, and to such an one the function of his subject is to solve the problems of that subject.

Others claim that the function of all subjects, the reason for their existing, is to solve the problems and satisfy the needs of practical men. No subject, say they, should be studied except as it is useful in promoting the sum total of the efficiency and happiness of the average man. They claim that mathematics can be justified only if it can be shown that from the results of the work of specialists practical good accrues. If the chemist in his laboratory discovers truths which will combat disease and promote the common good, he is justified in being a specialist. If the philosopher can organize knowledge in such a way that the man in the street is helped to efficiency or happiness, he justifies his effort.

Where the theoretical merits of the controversy between the two camps lie, need not concern us here, save in this particular, that pupils of the grades and of the high school have not yet developed, nor are they interested in the specialist's point of view to any great degree. They work best when in their own lives they can see the use of the units taught. And, contrariwise, teachers have the specialist's attitude more strongly than has the average man. So in the school room there is found a greater gulf than in the world at large. Hence, teachers have to be especially careful to make every reasonable attempt to teach subject-matter as a means to controlling values outside the subject taught, rather than as material which is acquired because of its own worth for and by itself.

A few examples will make this clearer. For instance, why study history? Two types of answers may be given: (1) Because it is worth while for its own sake; (2) because it assists in the understanding of modern institutions. Again, why study subjunctives in Latin? Again two types of answer may be given: (1) Because they should be known; (2) because they will help in understanding subjunctives in English. Or, again, why learn to spell? And the answers are: (1) Because one should be able to spell; (2) because it will be necessary in order to convey ideas correctly.

In the first term of each pair of answers we see the specialist point of view maintaining that the thing is worth while for its own sake. In the second, we have an attempt to show some other reason for its study. History may not be of value to the pupil, modern institutions may; Latin subjunctives may not be of value, English subjunctives possibly might. Mere ability to spell may be a bore, while writing letters correctly may mean much to pupils.

Of course, if these second terms are of no more value than the first terms; if, for instance, pupils have no more interest in understanding modern institutions than in history, no more interest in English than in Latin subjunctives, and hold the conveying of ideas exactly to be of little value, there will be no more motive in the one case than in the other. But an effort to discover the second, instrumental, type of function gives a second chance to secure a motive for study, gives another opportunity to secure a useful life for the facts secured by the pupils. This is more than an even chance, and is well worth taking.

Summary.—Returning to our two illustrations in the introductory section of this chapter, we are now able to assign differing values and places to the members of the lists there tabulated. In the case of science, the second function listed is the intrinsic function. Whether this information should be studied for its own sake, or because it may be an instrument in getting control of other values, the author does not state. The first function of science stated is indirect and disciplinary.

In the case of history, the first and sixth functions are intrinsic. The second probably illustrates the fact that history is an instrument in the fulfillment of interests, and thus considers the subject-matter as a means. The third, fourth, and fifth are indirect functions. These come mainly as by-products; only occasionally are they brought to the focus of attention. The sixth views history as an end in itself, worthy of study because of the pleasure history as history gives.

Exercises

1. What are the intrinsic specific functions of a lead pencil, a fountain pen, an electric light, a book-case, a chair, a rocking chair, a Morris chair, a hammock, a vacuum cleaner, a match, a fireless cooker?

2. What are the intrinsic functions of nouns, adjectives, adverbs, tense, voice, mood, comparison of adjectives, per-

son and number, as forms of the sentence, the function of all grammatical forms being stated as that of making oral communication more exact?

3. What may be the intrinsic and indirect functions of walking, haymaking, cooking, clerking in a store, using a telephone, playing baseball, reading good literature, selling real estate?

4. What indirect values may flow from a study of physical geography, botany, spelling, reading, arithmetic, physics? (If available, read pedagogical articles upon the values of these subjects.)

5. Give ten examples of how adults may use a thing for one purpose when it is intended to be used for another purpose.

6. Give ten instances in which pupils have not seen the author's purpose in connection with certain selections or topics, but have used them for a quite different purpose.

7. Give ten instances in which you, either in the school room or among your friends outside, have had pupils or friends do things when the reason they had for doing them was not the reason you had in mind for having them do them. Did it ever work better for them not to know your purpose, even when your purpose was to benefit them? Explain.

8. Give five instances of where, by using things for purposes for which they were not intended, disastrous results followed. Give a like number in which the use was satisfactory.

9. If a teacher follows the lead of each pupil's needs, what will be the result in a class of thirty? What will you do about it?

10. Give ten cases where you have felt that people needed certain things but they themselves did not feel the

need. In any of these cases, when they did, or secured what you felt they needed, how was it brought about?

11. If a scientist tried to investigate only the things that would be of immediate practical use, what effect would it have on his science?

12. If a teacher does not care whether the pupils see the use of anything taught, what effect has it on him? On the pupils?

CHAPTER IV

THE INTRINSIC FUNCTION OF SUBJECT-MATTER

Section i. Subject-Matter of the Race and of the Pupil

Subject-matter is found in two places—in the experience of the pupil and in the active experiential life of the race. The pupil possesses a body of subject-matter for the most part lacking in systematic organization; but some of it is always vigorous, and it frequently is well organized. It will be shown later that true learning consists in progressively utilizing this experience in gaining new subject-matter or in organizing that which has been hitherto unsystematically collected by the pupil. The race, also, has worked out a vast body of subject-matter, in part unsystematic, but to a greater extent organized into coherent systems.

In organizing and adding to the experience of pupils, racial subject-matter is of prime importance, because the pupil, when he wishes a new method of action, can turn to that which lies at hand, fresh from the polishing touch of the race, can therefore save time and effort, and can actually secure greater efficiency than if he had worked out the method as an entirely original production.

Racial Subject-Matter.—The most apparent groups of racial subject-matter are the divisions or fields of knowledge, consisting of the physical sciences, such as *physics, chemistry, botany, zoology, geology, etc.;* the social sciences, consisting of *sociology, ethics, history, economics,* *language, etc.;* and the abstract sciences, consisting of *mathematics, philosophy, etc.* In addition to these well-organized subjects, there is a great mass of subject-matter that is not well organized and cannot be classified completely under any of these heads.

Each of these groups is constantly undergoing modification, some parts remaining constant, while others change. For instance, in the well-known ethical field, the Ten Commandments have remained constant as methods of moral conduct through many generations and are still considered valid. But certain of the other moral precepts enunciated by the Hebrews, such as the prohibition by Paul of participation in religious services by women, have become obsolete. The Bible itself is the surviving remains of a much larger Hebrew literature which was current at various times but which has now to a great extent disappeared. And in the ages succeeding the writing of the books of the New Testament, thousands of other books dealing with the principles of the Christian religion have been current, but only a very few of these have been of interest to peoples of later generations. In like manner, many of the books upon moral subjects today are of purely contemporary value and will not be used by succeeding ages.

Explanation.—This permanence and transitoriness of subject-matter is explained by the following facts:

First, the needs and problems for the satisfaction of which subject-matter has been created and is used, are of two sorts—fundamental and transient. The fundamental needs and problems persist throughout generations; the transient appear for a short time and then disappear. For instance, much was written and many theories were put forward forty years ago to explain the query, Who stole Charlie Ross? But to this generation the problem is only a name, and fifty years hence the last traces of vitality in the problem will have disappeared. The scholastics were much concerned about the question of the trinity and unity of the Godhead, a problem in which this generation is not vitally interested.

Second, subject-matter dealing with permanent problems has a better chance to live since the fundamentals remain through succeeding generations.

Third, the best methods of solution will remain, while poorer methods are discarded. The problem of cutting grain is fundamental and has persisted from the beginning. Yet we find the hands, the sickle, the scythe, the cradle, and the reaper each in turn supplanted by the later improvement, and all by the binder, because in each case the newer method of solving the problem was found to be better than its predecessors.

There are, then, four possibilities of survival. If a method solves a *fundamental* problem *well,* it has a good chance for permanency. If a method solves a *fundamental* problem *fairly* well, it has a smaller chance to survive, since it will continue only until a better method is devised. If a method solves a *transitory* problem *well,* it has a chance of survival during the short life of that problem. And if a method solves a *transitory* problem *poorly,* its chances to live are slight.

Racial subject-matter at the disposal of the pupil should, then, consist of the best methods of solving both fundamental problems and transitory problems of his generation. The teacher has to select from among the methods now current those that are best, and has also to *emphasize* among these the methods which solve the fundamental problems, in order that what is taught may function longest in the pupil's youthful and adult experience.

Pupils' Subject-Matter.—The pupil's experience is exactly parallel to the foregoing. He has needs and problems, some of which are fundamental, others of which are transitory. Activity and rest, companionship, curiosity, constructiveness, food, are fundamental. The needs of the moment are multitudinous, passing rapidly on and off the stage of effort. Whims, fancies, insistent demands that soon cease, and a thousand others, could be named. The pupil, like the race, has worked out solutions for his problems. And when the problems are fundamental and the solutions are good, they remain; when the solutions are poor they will be displaced upon the discovery of better.

The pedagogical meaning of this is that racial methods of handling problems which the pupil has will be serviceable in helping him to revise his methods and secure those most efficient methods which will remain with him throughout life, or until superseded by better methods.

From the teacher's point of view, racial subject-matter is also a means by which the pupil may be led to discover his own problems and interests, as when a pupil, given the task of studying algebra, may find thereby in mathematics his life work. This fact is mentioned, however, with some hesitation, because teachers are overworking it at present in justifying the introduction of subject-matter very often initially and sometimes forever foreign to the vital experience of many of their pupils.

It is evident from this section that needs and problems should be closely related to whatever race subject-matter is studied, and it is implied that the teachers should closely scrutinize in each case the specific intrinsic functions of each group and unit of subject-matter, so that in the *first* place the appropriate subject-matter may be intelligently selected to solve problems already present in the pupil's consciousness; and so that in the *second* place the appropriate need may be found for subject-matter that the teacher has tentatively decided should be presented to his pupils. In the following sections illustrations will be given of the intrinsic functions of several groups.

Section 2. The Language Group

The common definition of the function of language is that of communicating ideas. This is, of course, correct. But if a definition can be given that will include an analysis of function, answering the questions, By whom are ideas communicated? What ideas are communicated? and, To whom are they communicated? it will be more useful in methods of teaching. The following statement, in line with our conception of values, is given, and will open up the whole question of language teaching.

The intrinsic function of language is (1) the communication through words, (2) of things of value, (3) between persons having a like appreciation of these values, but (4) possessing different levels of control. In so far as other means than words are used for communication of things of value, we have language only by analogy. Painting is not language in the strict meaning of the word, because it communicates values through colors rather than through words.

Language will not be used to best advantage unless there is something of value to be communicated. Those subjects upon which we have nothing of value to say and over which we neither have nor desire to have control, we do not talk about. On the other hand, we are not only willing but anxious to discuss those topics and ideas which are of great value to us and over which we either have or desire to have control. The more valuable they seem, the more enthusiastic, forceful, and burning are our words. The man with a message is one who has a deep appreciation of some value and of the efficacy of some method of securing control over it. The ordinary school composition set by the teacher is not conducive to good expression if it is not felt by the class to be of *value*. Whether it is valuable as judged by adult standards does not materially affect the situation, for if the pupil does not feel the value it provides no motive.

Unless there is an appreciation of values common to both speaker and hearer, language will not function properly. We do not tell our jokes to the literal-minded. The lover of Shakespeare does not discuss his beloved author with a street urchin, nor do we talk about our great ideals to one who will scoff at them. But if we find another lover of Shakespeare, how easy to converse with him for hours; and how easy it is to grow enthusiastic over our ideals with one who is in sympathy with them! On the other hand, we are not surprised that the dry mechanical teacher of language, who looks upon compositions as compositions, and does not lead his pupils to feel that their themes are of real interest to him, should have pupils who detest the subject.

Unless there is a difference in level between speaker and hearer there will be little force in language utterance. Language is for the purpose either of asking questions of some one with better control, or of answering questions, implicit or explicit, by some one with a higher level of control. We do not ask a question enthusiastically of one who we believe knows less about the subject than we ourselves. Nor, on the other hand, are we eager to give information on a subject to those who we think know more about it than we. We have to feel that we can give something that the audience will consider valuable before we use language in the way that is most vigorous and forceful.

Under some circumstances we use language as a means of revealing a consciousness of social worth. That is to say, to individuals who, because of the possession of a supposedly secret body of knowledge, consider themselves to belong to a distinct group and order, we express our ideas for the purpose of showing them that our possession of this knowledge gives us also the right to belong to the group. Secret societies afford examples of this. It is this insufficient motive which is most commonly used in school. The pupil recites in order to prove his knowledge of a certain fact which the teacher and the other pupils are supposed to know.

Social approval is, in fact, one of the strongest of the motives operating in individual or in racial history. To win the commendations of the group is, for the normal individual, an innate desire; to incur the condemnation of the group is one of the most serious of punishments. So far as the school is concerned, this is worked to its extreme limit—to such an extent that it becomes often inoperative, as when the teacher's good opinion is not greatly prized by the pupils and when the "public opinion" of the children is at variance with the opinion of the teacher upon questions of what is or is not of worth.

Pedagogical Applications.—A brief application of this function may be made to the problems of teaching. *First,* the pupil writing composition should choose his own individual topics on which to write. He should be advised to write superlative experiences. That is, he should choose the *most* interesting, the funni*est,* the sad*dest,* the *best,* etc. These will be the most valuable to him and most likely to prove interesting to his audience.

Second, the pupil should have as his audience, not the teacher merely, but the class as well. If he is writing for the class, he will be more likely to feel that his level on his particular subject is above that of his audience.

Third, the pupil should be taught not only to choose for his themes topics which are of value to himself, but he should learn to select from among such themes those which will be likely to prove of interest to his audience. This will help to keep him from being a bore in later life.

Fourth, the teacher should cultivate the pupil's desire to be told things about which he does not know, and should cultivate the habit of making the pupils aware that they are able to tell him things with which he is unfamiliar. There are some fundamentals ignorance of which would be a shame to him, but there are countless other things to claim full knowledge of which would be sheer hypocrisy. This difference of level will be easier to obtain if the pupil writes for the other pupils as an audience. For, while children may hesitate, thinking they cannot tell the teacher things he does not know, they are always certain that upon some subjects other children do not know so much as they.

This principle deals a severe blow to reproductive compositions. For if all the children have been studying the same story or facts, it is evident that when they write compositions they know that the audience knows the facts already, and the writing is done either for the approval of the teacher or as a drudgery to be performed from necessity. Only in one way can this difficulty be alleviated, and that is for the teacher to raise questions of interpretation so that each pupil may give *his* idea of the question. But, at best, reproductive work is deadening and should be left for the other subjects of the course of study in which it is necessary for the teacher to find out how well the pupil has grasped the lesson.

Forms in Language.—Each form in language has a specific function. Punctuation marks and rules of grammar assist, each in its own way, to make the communication of values more exact and definite. Each has been worked out to meet a difficulty. When the difficulty arose, the race worked out a device for correcting it, and these devices are called the forms of language. The earliest written work contains no periods or paragraphs. But it is very difficult to discover from this material what value the author was attempting to communicate. So the period is invented to indicate where a sentence ends. Indentation of paragraphs serves a similar purpose, and capitalization has a similar use. These arbitrary symbols later come to have other uses. But in every case each does something specific and individually different toward making the communication of values more effective.

Pedagogical Applications.—Since forms are tools each with a specific function devised to help the child over specific difficulty, it follows without question that the form should be taught only when the difficulty for the removal of which it was created is *consciously* felt by the pupils. Why teach unity as a law of the paragraph if the pupil does not see that his failure to observe the law of unity results in his failure to make clear what he wishes to tell? Why teach paragraphing unless the pupil is made conscious of the fact that the thing of value which he wishes to share with his audience is mutilated because he does not paragraph? There is a reasonableness about forms which appeals to students only when they become conscious that language deficient in forms fails to fulfill the function of language. A fuller statement of a method of introducing forms so as to observe this principle will be found in Chapter XV.

Rhetoric.—The desire to see how we communicate values exactly has given rise to grammar and rhetoric. The term "rhetoric" is derived from the Latin, *rhetor,* meaning a teacher of oratory, a rhetorician. The function of the rhetor in Roman society was to teach rules by which disputants and orators might convince their audiences. The object in view was frequently the very practical one of convincing judges and common people that the line of action proposed by the speaker was the correct one to follow. In other words, the speaker had something of value, some way of acting, of settling a lawsuit, or of deciding political questions which he considered of sufficient worth to be followed. Rhetoric was the compilation of the rules which would enable him to communicate his conviction most effectively. In this way a rather large body of rules was formulated; and to these we now apply the terms rhetoric and oratory, rhetoric dealing with structure of a composition, oratory with its delivery. We include within the compositions considered rhetoric not only those which are to be delivered from the platform, but also those which may be published through print. However, the two cases are similar. In each there is, *first,* the valuable experience to express; and, *second,* the rules which will make the expression effective.

The study of rhetoric embraces the study of the forms of discourse, narration, description, argumentation, exposition, and of the paragraph. The function of each of these is to set forth some idea, the solution of some problem thought to be valuable. In narration, the purpose is not simply to tell a story, but to embody in the story some idea possessed by the writer, to use the story as a means of illustration, the "idea" being the meaning of the illustration. If the writer does not choose to use narration to set forth this idea, he might use description, argumentation, or exposition, each in its own way being capable of conveying the all-important idea (or solution). The function of the paragraph in this connection is to set forth the individual units that are to be used in the handling of the solution or idea.

Grammar.—The function of grammar is to set forth the rules *by which words are related in sentences* in order to convey values with *definiteness and ease*. The original form of the sentence with very young children is somewhat analogous to our present interjection. In its early form the sentence is composed of a single "word" which contains within itself, rather indefinitely, the experience which is to be communicated. Later, this one "word" is, under the growing desire to be more definite and facile in speech, broken up into all the grammatical forms which are evolved and utilized by the adult. For instance, the pronoun probably arose from the desire to have not only greater definiteness, but also greater ease of expression; and the adjective arose from a desire to make the implication contained within the substantive more definite, as, for instance, when, instead of directing a person to *a* house, we direct him to the big, red, brick house.[1]

Pedagogical Applications.—If each grammatical form, even the most subtle, has been created by the race to express values more definitely or more easily, it follows that functional rather than structural grammar should be taught. The history of the sentence in its rough outlines should be followed in detail sufficient to set forth the problem of

[1] Cf. Chapter 19 (Illustrative Lesson on the Adjective).

grammar, viz., the securing of definiteness and ease. Then no form should be taught without the class seeing how it aids in its own specific way the accomplishment of either of these aims.[1]

Punctuation.—The generic function of punctuation is the same as that of its parent, language; it helps to communicate values. Its specific contribution is that of helping to convey relations and connections in thought by means of certain arbitrary symbols called punctuation marks. And each of these marks has a specific function which may be found tabulated in any text-book on punctuation.

Pedagogical Applications.—If each mark indicates a certain kind of relation, it follows that the marks cannot be efficiently taught as tools of communication if the child cannot see their intrinsic utility. For instance, the comma cannot be insisted upon by the teacher, nor utilized by the pupil, except in certain conventional situations, until the pupil is able to appreciate the relation which it is meant to express. And since the comma expresses the most subtle relations of any of the punctuation marks, only its simpler use should be taught or insisted upon before the eighth grade of the elementary school.

Reading.—Reading is similar to language except in one particular. The *reader* does not express his valuable experience in his own words. He accepts the words of another, and to that extent only he makes them his own.

Hence, general methods for teaching reading are identical with those for teaching language. Other things being equal, that reading will be most efficient which communicates something of value to another person who, though

[1] For an attempt in high school work to carry out the view stated here, see Scott & Buck's *Brief English Grammar,* Scott, Foresman & Co., Chicago, 1908.

able to appreciate its value, has not come into possession of it. In other words, reading is most efficient when the reader presents something, which to him is valuable, to an audience which is sympathetic but lacking in the full knowledge of what he presents.

The fact that the great bulk of the reading in the public schools transgresses these three conditions is so common as to escape notice.

How can a pupil simulate great enthusiasm for reading when the teacher and every other pupil in the class has the text open in front of them and is reading, if reading at all, to criticise his manner of reading. If any adult will put himself in such a position for an hour, and read to an audience which knows all about what he is reading, and is merely waiting for slips in expression to occur, I venture to say that he would be on the verge of nervous prostration. Doubtless some of this sort of work is necessary for drill; doubtless, also, in the early grades, when pupils are interested in getting the thought through the reading of mysterious and romantic signs on the paper, there is little danger. But it is carried entirely too far when pupils are seldom allowed to read to an audience under the natural conditions of reading.

Writing and Spelling.—Handwriting as a member of the language group attends to the *forms of letters* as its special province in the effort to communicate experiences of value. Legibility and, to a lesser degree, speed are the essential characteristics. Writing fulfills its intrinsic function when it promotes with facility the transfer of experiences. The function of orthography is to *arrange letters in words* in the order decided by social usage, all of which is intended for the purpose of accurately communicating valuable experiences. The penalty for incorrect spelling is, *essentially,* not the stigma of being uneducated, but the failure to give thought correct expression. A phonetic or simplified spelling is justifiable on the ground that it will be less likely to engender inaccurate communication than is our present involved, conventional orthography. The objection to phonetic spelling, that we miss thereby the historical markings of words, does not decide the essential point at issue. The question must be settled upon the grounds of increased facility of communication. Only in so far as the ability to see the derivation of words adds to accuracy of expression can this objection be considered as an argument against changing to a phonetic system.

Section 3. History

The intrinsic function of history is to *real*-ize the past in such a way as to help us appreciate and get control of present values. Or, to put it in other terms, history is studied to (1) get a picture of the past in order to (2) understand the present.

History may be studied for its own sake, or as an instrument for understanding the present. They who study it as an end in itself are concerned only with the past; its relations to the present are secondary and subsidiary to this other aim. They claim that the function of history is to *real*-ize the past, and that present conditions, problems, and activities are of use in so far as they assist in this process. History is from this point of view a value in itself, worthy of being controlled for its own sake.

When history is studied as an instrument it is considered to be of value chiefly because it provides one means of interpreting the present. Only those situations and facts in the past will be selected for discussion which have close bearing upon the present. They must, of course, be *real-*

ized. They must be built up, but only to a degree sufficient to throw light upon modern institutions and problems.

Whichever view of history is adopted, we are warranted in saying that in both the past and the present there are values to be controlled, and that each generation devised means of securing this control. Hence, in both past and present the race has been busy solving problems, and every situation in history may be viewed as an attempt to solve one or several problems with the data which that particular group of people had at hand. Moreover, many of these problems are common to both past and present.

The problem of government is of this perennial type. Each generation has tried to find a better solution than that of its predecessor, and in turn has left its work as a heritage to the generation which followed. In fact, all the great problems of society are continuous, and by following them from their early beginnings we can see how their solutions have been evolved, and how the problems themselves have been modified by changing conditions. By tracing these problems from their fundamental form, while keeping constantly *in view* the present form of the solution, there is little danger of restricting the function of history to the *real*-ization of the past, and thereby destroying much good that could be gained from it.

Pedagogical Applications.—If, when we discuss movements and institutions, we view them as solutions of problems, and if we think of each situation in history as having some problem within it, we bring the history more vividly into the lives of pupils than if we view the situation as merely collections of facts. The element of reason and judgment then enters to illuminate or vivify the content of memory and imagination. Then we may view the continuity of history as a continuity of these problems, the problem and solution being affected in each situation by the entrance of such new factors as make changes necessary. (See Chapter XV.)

Influence of Pupils Upon Function.—In the last chapter we stated that function varied with pupils. This is well brought out in history. As has been said, the function of history is to solve present problems by a relation to the past. This holds in all grades, but the sort of problem solved varies. In the primary grades, history (isolated stories) is studied to help solve moral problems—George Washington and his little hatchet—or to explain how common tools have come to be, as the bow and arrow, the spade, etc. In the fifth and sixth grades the function may be to solve problems and satisfy needs for violent and bloody death and perilous adventure. In the high school, perhaps, the problem becomes a political one. Thus the problem varies from grade to grade, and the intrinsic function changes with it—changes not in abstract statement, which remains the same, but in the concrete content, which varies from year to year.

Section 4. Geography

The intrinsic function of geography is to give control of values through the place concept. When the urchin says, "The jam jar is in the pantry," he is using place to control the value called jam. When the tourist, driving across country, learns that dinner may be had at Crossroads, he has received the assistance of geography. Oranges in Florida, wheat in Alberta, whales in the southern Pacific, and tea in Japan are all cases in which values—oranges, wheat, whales, tea—are controlled by place in so far as place can control them.

Geography is of two sorts. It tells us *where* values are located, and, more recently, the "new geography" has been attempting to explain *why,* in terms of *place characteristics,* they are located there. Geography tells us that oranges grow in Florida and California; and, in addition, endeavors to show, in terms of the climatic and physiographic features of Florida and California, why oranges grow there.

In order, then, to use geography, it is necessary that the place in which values are found be thoroughly understood. And this understanding of places is given by physical geography, whose function, then, becomes that of analyzing the place concept. In other words, physical geography deals with the physical features of the earth's surface. It is divided into physiography and climatology.

Hence, to repeat, we make geography when we take anything we desire to control and investigate (1) where it can be found, or (2) why, in terms of climate and physiographic conditions, it is found there. For instance, the geography of prunes would be found in a statement of where they grow and the conditions of climate and land conformation that are essential to their growth.

It is evident that when we study the industries of a city we are not necessarily studying geography. It becomes a geographic study only when we explain in terms of climate and position why they are there. We could just as easily have sociological or economic studies of the industries. When the races of men are studied we are not necessarily studying geography. It becomes a geographical study only when we explain in terms of climate and land conformation why the races have their differentiated characteristics When we study the wealth, commerce, and industries of a country, this in itself does not constitute geography. It becomes a geographical study only when we endeavor to explain the wealth, commerce, and industries in terms of climate and physiographic conditions. And, lastly, when we study the products of a country, it becomes geography only when we explain these products in terms of their physical environment.

A careful study of some geography text-books with this idea of geography in mind will show that much contained in them is not geography. There are explanations of how different products are cultivated and harvested; the races of the world are described. The first of these is a study of industries, the second of sociology. Because of the introduction of so much non-geographical matter into the texts, geography has been called the scrap-basket of the sciences. But while it is not geography, it is certain that much of this material can be better treated in geography texts than elsewhere. Consequently, it is legitimate to have it inserted there. And, so far as practicable, the material should be treated from the standpoint of geography. However, it is necessary for the teacher to distinguish between what is and what is not geography in the texts.

The practical value of the "new geography," which explains in terms of physical environment why things are found at certain places, is great. The United States Department of Agriculture uses it zealously in the following way: They have experts traveling all over the world trying to find new and valuable food products. When these are found, the conditions of temperature, moisture, length of season, etc., are carefully investigated. Then the Department picks out, if it can, places in this country where these conditions are approximately the same, and attempts to grow some of the newly discovered varieties there. If the conditions are identical, the plants thrive and the new food product is added to the list of domestic products.

Very interesting geographical studies can be made by pupils who have this information at hand. For instance, pupils can, when furnished with the proper data, figure out the probability of growing tea successfully in Illinois, cotton in Nebraska, tobacco in Manitoba, wheat in the Amazon valley, cherries in Brazil, etc. All that is necessary is to know (1) the conditions under which these products grow, and (2) whether or not the localities selected have these conditions.

Pupils Affect Intrinsic Function.—As in history, the type of problem which is solved by a reference to place varies from year to year. The primary children are interested in the locality of things of value in their immediate environment—place geography. So also the boy of eleven or twelve sees in his geography a setting for his deeds of adventure. In the higher grades only does he to any marked extent come to see geography as the relation of these things of value to place. The rational function of geography is then for the first time understood.

Section 5. Subjects in Primary Grades

The intrinsic instrumental function of subjects is best brought out, and most easily used, in the lower grades, before the subjects have crystallized. To be sure, in some ultra-conservative schools we find the children studying arithmetic, reading, phonics, spelling, drawing, and construction work each in separate periods in the first two grades. But in progressive schools the subjects are fluent and one cannot always tell in the lower grades where one period ends and the other begins.

Arithmetic.—It is a matter of common occurrence for arithmetic to be used for its elemental purpose. A game is played. To record it and to select the victor, recourse must be made to notation and addition. A snow-shoe is to be made of such and such a length, and denominate numbers are used. A sheet of paper is to be divided and fractions occur. In all of these cases the intrinsic function is obvious and appealing. The purpose is seen and the need is felt.

Later on, in the fourth and succeeding years, the subject is, perhaps, studied in isolation, and the instrumental purpose of the subject-matter for situations outside the subject is not so easily seen—perhaps cannot be seen when learned. For instance, it may be difficult to show why the multiplication tables should be studied for any other reason than that "they should be." And I think the best attitude to take is this: *You are studying arithmetic, you have done addition, but are slow. Let us shorten the process. The method of shortening is by multiplication, which does it in this way.*

An ingenious teacher, however, can make concrete the need for multiplication by utilizing situations in which multiplication will actually save time, as, for instance, in keeping score where the teacher decreases the time for summation to such short duration that multiplication may be introduced as a heaven-sent device.

Reading.—Action work in primary reading shows beautifully the utilization of the intrinsic function. For, since pupils love to be physically active, they read and watch with interest when they understand that the only way to discover what to do is locked up in words to be read. "Roll the ball, Harry," contains a value which some one wishes to possess. If Harry does not know his own name, or the words *ball* or *roll,* he cannot perform the action. Hence, he reads, realizing the intrinsic function. Later he may read from habit or necessity, but now he realizes its place.

Literature.—Literature shows this same characteristic very clearly. The general statement of the function remains the same, but the objects around which it centers vary. For little children the function of literature has to do with games and fairies and rhymes. Later these change to adventure, later to strongly emotional lines during adolescence, and only to highly reasoned problems later.

The teacher, then, cannot settle the intrinsic function of subject-matter for teaching purposes until he has found out the peculiar problems and characteristics of the pupils who will use the material. This phase of the subject will be discussed in Chapter VIII, and the reader is advised to read the section on *Stages of Development* in connection with this section.

What holds true for these subjects holds true for all. Unfortunate it is that, as the work progresses further, we become so much the victims of isolation and formalism in subject-matter that this close relationship between school work and practical work is lost or so largely disappears.

Section 6. Other Subjects

The intrinsic function of *painting* is (1) the communication of values through color and forms (2) between persons having a like appreciation of these values, but (3) possessing different levels of control. The intrinsic function of *music* may be secured by substituting for "color and form" the words "consonant sounds." The intrinsic function of *basketry* is to make baskets, of *carpentry* to make articles from wood, of *cooking* is to provide nutritious food by means of heat, and of *millinery* to produce women's hats. The intrinsic function of *foreign languages* is to give us control of values which cannot be secured in our own language (as, for instance, by translations).

Foreign Languages.—The foreign languages have a peculiar place in national life and deserve a few words by way of analysis of the function stated. We study foreign languages because there is a spirit of nationality—the Roman spirit, the French atmosphere—which cannot be secured in translation; because valuable information needed in the prosecution of affairs can be found only in the German, the French, etc., not yet having been translated; and because in contact with foreigners we cannot perform our intentions without our being able to get information from them or to give information to them. Sometimes a student of English grammatical forms receives assistance from a study of the cognate forms in other languages; but this value is not very important in the life of the average pupil and the usefulness of the foreign language for this purpose is not sufficient to make it an intrinsic function.

All other values, such as training in exactness, etc., are indirect functions and can present no adequate justification for the study of the foreign languages.

It is evident from this that unless a study of a foreign language is carried far enough to get the student into the spirit of a foreign people, to give him a reading knowledge so that he can get what he wants from its written documents, or to give him a speaking knowledge so that he can converse with foreigners unable to converse in his tongue when he meets them, there is no adequate justification for the study of a foreign language. Moreover, if the student's adult occupation is not likely to require a knowledge of the written or spoken language, there is no justification for its study from that point of view. In fact, the study of a foreign language should not be *required* of pupils in the high school in the average American community. A student may take it as an elective but to require it is to require something that may have little intrinsic usefulness. The discipline in exactness, etc., can be secured in the prosecution of subjects more generally useful.

The function of *physics* is to control values by means of the "force" concept, of *chemistry* by means of the concept of ultimate (chemical) elements, of *zoology* by means of the concept of animal life, of *botany* by means of the concept of plant life, and of *sociology* by means of the concept of society.

Students are advised to work out the intrinsic function of each of the subjects with which they have to deal directly or indirectly.

Exercises

1. (a) Show how botany and zoology have undergone changes due to the theory of evolution. (b) Why is it that books on any of the sciences become out of date so rapidly?

2. Why is Shakespeare read now by so many people when Marlowe and Greene, who were very popular in Shakespeare's time, are so little read now?

3. Observe a child for an hour and note instances of the occurrence of permanent and transitory needs and problems.

4. Recall ten minutes of your own life recently and note the transitory problems that have occurred.

5. Give a list of ten topics for compositions that would appeal to you as being the most interesting you could write upon for a sympathetic audience.

6. Name five topics you would be delighted to have some one who is equipped write upon for you. Could composition topics be provided in this way—that is, by having pupils state ones they would like to have some one write

upon and assigning these to some other pupils who think they are fairly competent to write upon them?

7. Give five instances in which the desire for the approval of the teacher was no motive for particular pupils.

8. Give an instance in which a strong motive for a composition was secured by having pupils give their individual interpretation of a bit of subject-matter known in common by a class.

9. Why is it that when you ask some pupils to write original compositions, they ask you to set a topic for them? How would you cure the difficulty?

10. Select five well-known stories and show that the writer presented a problem which the characters by their action solved.

11. Give five cases in which meaning was made obscure or incorrect because of faulty spelling; five others where the same thing occurred because of incorrect punctuation; also five where illegible writing produced disastrous or comic results.

12. Name five great problems that mankind throughout its history has continually been trying to solve. Name five problems that were peculiar to the nineteenth century in the United States.

13. Give ten examples of the simple place-geography of a five-year-old child.

14. State the intrinsic specific function of all subjects in a course of study not discussed in this chapter.

CHAPTER V

THE STRUCTURE OF SUBJECT-MATTER

When there is some need to be satisfied, subject-matter is created or an attempt is made to create subject-matter which will satisfy the need. It is, of course, obvious that this subject-matter must be organized in some way and the more logically the better.

Definition.—A structure is defined as an organization of parts or elements constructed for the purpose of fulfilling some function. That is to say, if we consider a unit of subject-matter, as for instance a lead pencil, the parts are lead, wood, and probably rubber. Let us suppose the function of the pencil is to carry on the writing process with ease. Evidently the organization and the parts selected must be determined by this end. The lead must be not too soft nor too hard. In one case it would require frequent sharpening (not conducive to ease); in the other case, the fingers must press too hard and at the expense of ease. Wood is put outside in order to protect the fingers from being discolored, to make the surface large enough to be grasped easily and to keep the brittle graphite from breaking (thus saving trouble). The rubber is attached at the end in order to avoid the picking up of an eraser which may easily be lost.

Parts and Organization.—We are well acquainted with the organization of parts in the "outline." When an outline is made, the purpose is to present in compact form the most important parts of the structure. First comes the statement of the function, sometimes called the "topic." And then follows the outline, or structure.

The topic is always the solution of some problem or the satisfaction of some need. For instance, the topic *An Ostrich Hunt* is the attempt to solve the problem, "How is the ostrich hunted?" The solution is as follows:

Because of the ostrich's swiftness many devices have to be used in hunting it.

(a) In South Africa they are hunted in some places by horsemen who seek to tire them down.

(b) The Bushmen build an imitation ostrich upon their shoulders and thus are able to approach close enough to shoot them with poisoned arrows.

We meet in arithmetic, also, with the organization of parts to carry out a function. The problem, Find the cost of constructing out of inch lumber a box 4 ft. long, 2 ft. wide and 1 ft. deep, inside measurements, without a top, lumber costing $25.00 a thousand, has the following organization for its solution:

Area of sides =	$2 \times 4\frac{1}{6} \times 1 \times 1$ bd. ft. =	$8\frac{1}{3}$ bd. ft.
Area of ends =	$2 \times 2 \times 1 \times 1$ bd. ft. =	4 bd. ft.
Area of bottom =	$4\frac{1}{6} \times 2\frac{1}{6} \times 1$ bd. ft. =	$9\frac{1}{36}$ bd. ft.
	Total =	$21\frac{13}{36}$ bd. ft.

1000 bd. ft. cost $25.00.

$21\frac{13}{36}$ bd. ft. cost. $21\frac{13}{36}$ /1000 of $25.00 = 53c.

Structure and Logic.—It is a truism that every unit of subject-matter that is well constructed is logical in its construction. This means, *first,* that every part included in the organization must be relevant to the function of the whole. As an example of a poor structure the following may be cited. A lesson upon *The Benefits of Commerce*[1] has the following structure:

1. It enables us to exchange things we have but do not need, for other things which we need, but do not have.
   (a) Southern cotton growers have more cotton than they need, but do not manufacture cloth. The New England States manufacture cotton cloth but do not have the raw cotton. Hence an exchange is a benefit.
   (b) Tea grows plentifully in China and sugar in the West Indies. We do not raise these, but we do raise many things which the Chinese and West Indians do not raise so easily, and so an exchange is of advantage to both.
2. Water is very useful for commerce.
   (a) Cheaper way of transportation:
      (1) ships carry larger loads than wagons,
      (2) ships float and therefore require little force to move them,
      (3) this is realized as a reason for constructing canals.
3. Railroads are of use in transporting commercial commodities.

The first division is relevant but the second and third are not. They deal with "facilities for transportation," or some such question. If the author desired to keep them in his organization, he should have shown how they are benefits flowing from commerce.

Second. All the parts most relevant to the function must be included. Here an illustration may be taken from any machine. Suppose in a sewing machine the needle is

[1] *Sander's Third Reader* (1853), pp. 87-8.

lacking, then the functioning of the machine will be impossible. Again, when the problem arises, Shall I buy these curtains for my window? When I organize all the facts and parts I may bring in cost, weight, etc., but leave out the question of harmony of color with the paper in the room. This may invalidate the whole organization. In choosing a business partner I may, in thinking it over, consider his honesty, sympathy, physical fitness, etc., and because I fail to think of his lack of aggressiveness the purpose of the partnership may be defeated.

Pedagogical Hints.—To help the reader to find the *function* of any unit of written subject-matter several devices are used by writers.

First. Frequently it is indicated in the title. *The Benefits of Commerce, An Ostrich Hunt, The Origin of Species, How Valmond Came to Pontiac, The History of England*, etc., all indicate function in a general way. Sometimes, however, little assistance is given by the title. *Macbeth, Sandolphin, Lady Clara Vere de Vere* do not indicate in any exact way what is to be the specific function of the selection.

Second. The introduction to a selection and the topical sentence of a paragraph frequently give specific assistance in finding the function.

Third. Certain devices are used in text-books, such as subject headings and marginal headings. Considerable use of all three of these devices is made throughout this text, as a rapid leafing of the pages will show.

Fourth. It should be noted that, particularly in literature and music and art, it is sometimes impossible to adequately express the function in words. Critics who try to do so do not always agree, and probably the creator of the work could not state its precise function. The thing he wishes to express may be so large, so indefinable, or so largely a matter of feeling that one statement will not do it justice. Indeed, the fact that literary criticism frowns upon the moral at the end of a poem, and the fact that art critics object to the title's being too specific seem to indicate that it is not always wise to try to state the function even when it might be done.

Academically this is correct. Practically in dealing with immature children the teacher makes no serious mistake in giving what seems to be the best statement of function, and in then organizing the work of art to show how the function is fulfilled. This course does not mean that he need show the subtleties of technique by which the result was secured, but rather to lay bare the main divisions of content, going into detail as far as the maturity of the students will warrant. Outside of the æsthetic field, there is usually little difficulty and there is no objection to stating the function in concise form. Illustrations are given in the preceding chapters.

Explicit Relations.—In making an outline of the *structure,* it is well for teachers to make the relation of parts to the central function *explicit.* It is not always sufficient to merely have the relation in mind; to ensure the proper teaching of the relations it is advisable to actually *state* them. As an illustration the two following forms of outline may be given. Let us suppose that the function of a study of English history is "to show the formation of a popular national government of a representative character." The outline may be made as follows:

I. Anglo-Saxon government (to 1066).
II. Norman and early Plantagenet government (1066-1215).
III. Later Plantagenet government (1215-1485).

IV. Tudor government (1485-1603).
V. Stuart government (1603-1688).
VI. Modern English government (1688-date).

Or it may be made in this way, which differs from the foregoing in that the function of each subdivision in relation to the function of the whole is stated; i. e., is made explicit:

Function: To show the formation of a national popular government of a representative character.

Structure: I. Anglo-Saxon government (to 1066), which shows in the earliest form of the government strong local and weak central institutions.

II. Norman and Early Plantagenet government (1066-1215), which describes the establishment of a monarchy so strong that it overrides the local institutions.

III. Later Plantagenet government (1215-1485), which describes the rise of parliament but its failure to control the monarchy.

IV. Tudor government (1475-1603), whose significance is that in this period the people acquiesce in a strong monarchy because of commercial and religious interests.

V. Stuart government (1603-1688). This describes the victory of parliament over an absolute monarchy, and the definite establishment of a constitutional monarchy.

VI. Modern English government (1688 to date), which exemplifies the manner in which a strong central government is based on strong local institutions.

A statement of this latter sort made by the teacher will convince him as nothing else will that he has a logical organization. With such a statement he will be in less danger of going astray in his work from day to day. And this is the more certain if the principle is applied also to divisions subsidiary to these main divisions. Here the same procedure should be followed. The relation of the central theme should be stated clearly. Let us choose any one of the divisions stated above and make an outline for it, giving the function of each subdivision as follows:

V. The Stuart Government.

Function: To show how absolutism was overthrown and a constitutional government was definitely established by the people of England (as one of the steps by which a strong national government of representative character was established).

Structure:

1. The Crown and Parliament (1603-1640). Its significance is that it throws into strong relief the opposition between the royal prerogative and constitutional power.

2. The Privy Council. This exemplifies a method by which the executive tried to make itself stronger than parliament.

3. The Constitutional Resolution (1460-1649). This is the violent demonstration by parliament of its right to control the monarchy.

4. Military Despotism (1649-1660). Its significance is that in the throes of readjustment the parliament was supplanted by a military despotism.

5. The Restoration Government (1660-1668). This exemplifies the unwilling compliance of the monarchy with constitutional forms.

Such a statement as this, in so far as it is explicitly a statement of the bearing of each subhead upon the function of the large division and upon the function of the whole organization, will, as said above, help the teacher to get the proper perspective. It will keep him from introducing irrelevant material, and from emphasizing unimportant points in the history.

For the direction of students in making outlines it is well to call the main divisions of a structure the divisions to the first degree and the subdivisions of these divisions to the second degree, etc. Thus, of the last two outlines the first is an outline to the first degree, and the last is an outline of one division to the second degree.

Relativity of Function and Structure.—The structure varies with the function. For instance, if we make the function of American history the portrayal of deeds of heroism, we would naturally organize a structure upon that basis. We would select all the deeds of heroism and would neglect other facts. But, if the function is made that of showing the organization of independent local governments into a strong federal government, we would select our facts from a different basis. Many of the facts that would be used in the former case would be omitted in the latter case; many others would be added, and each would have an emphasis placed upon it in harmony with the function.

On the other hand, the function is dependent upon the structure. For instance, in American history we cannot make the function that of showing the growth of Oriental despotism, because the facts cannot fulfill that function. And likewise, it is a sad wrenching of the structure to make the study of literature that of exemplifying rules of grammar. The poem was not intended for that; the structure will not bear such a function without destroying itself. Again, we cannot use a feather to drive nails. The feather can be made to serve only those functions which are consonant with its structure.

Units of Subject-Matter.—The term "unit" is used in connection with subject-matter to indicate a relatively distinct portion of a subject. We speak of each unit of subject-matter as being an instrument designed for a specific purpose. But the difficulty is that the term may be applied in such a way as to lead to confusion. For instance, in the illustration in English history given above, we have six units in the whole. But we may also use the term in describing the subdivisions under V, and state that these are five units.

Groups.—We cannot speak of the smaller units as recitations, because frequently two or three recitations may be occupied in the study of one unit. Hence probably the best we can do is to use the term "group" for these larger divisions, and the term "unit" for the smallest units that are taken up as relatively complete and distinct divisions. In the subject just referred to we may then say that there are six groups, and five units in the fifth group.

Units and Recitations.—Usually one recitation is taken up with one unit. Frequently several recitations are needed to get control of one unit. Sometimes two units or more may be taken up in one recitation. No rule can be laid down as to the amount of subject-matter to be covered in a recitation, unless the one who makes the rule knows the class and the subject-matter.

Exercises

By *function* is here meant the *intrinsic function.*

1. State the function and structure of some particular safety pin, house slipper, corkscrew, chair, match, waste-paper basket, and comb.

2. In what respects may each of these be poor structures by not having necessary elements?

3. In what respects may each of these be poor structures because they have unnecessary elements?

4. Select three different types of problem in arithmetic and state the function and structure of each.

5. What are the advantages of making the relations of the elements of the structure to the function explicit?

6. Would you require pupils in a recitation to make each element explicit always? Why?

7. In organizing a lesson for teaching, is it necessary to work out the outline into divisions beyond the first degree? Why?

8. Take a text and divide into groups to the third degree of division.

9. Divide one of these last subdivisions into units.

10. Divide this subdivision into daily lessons and indicate how closely the daily lessons correspond to the units in size.

CHAPTER VI

EXAMPLES OF FUNCTION AND STRUCTURE

Section 1. Every Unit of Subject-Matter Has a Function Which Its Structure Is Organized to Perform

Hygiene.—"And now, what becomes of this breath which passes from your lips? Is it merely harmful; merely waste? God forbid! God has forbidden that anything should be merely harmful or merely waste in this so wise and well-made world. The carbonic acid which passes from your lips at every breath—ay, even that which oozes from the volcano crater when the eruption is past—is a precious boon to thousands of things of which you have daily need. Indeed there is a sort of hint at physical truth in the old fairy tale of the girl, from whose lips, as she spoke, fell pearls and diamonds; for the carbonic acid of your breath may help hereafter to make the pure carbonate of lime of a pearl, or the still purer carbon of a diamond. Nay, it may go—in such a world of transformation do we live—to make atoms of coal strata, which shall lie buried for ages beneath deep seas, shall be upheaved in continents which are yet unborn, and there be burnt for the use of a future race of men, and resolved in their original elements."

—Charles Kingsley.

Function: The function of this subject-matter is to answer the question, Is breath exhaled merely waste?

Structure: The answer is, No. The reasons for it are the following:

1. The general one, that it is not according to the economy of God's laws.
2. That it is a boon to nature. This is illustrated by stating that it may produce:
   (a) vegetation,
   (b) pearls,
   (c) diamonds,
   (d) coal.

Literature.—From *Cymbeline,* by Shakespeare.

"Hark, hark! the lark at heaven's gate sings,
  And Phoebus 'gins arise,
His steeds to water at those springs
  On chalic'd flowers that lies;
And winking Mary-buds begin
  To ope their golden eyes;
With everything that pretty is,
  My lady sweet, arise;
    Arise, arise!"

Function: To portray the state of mind of a lover in his effort to awaken his lady-love.

Structure: This may be analyzed as follows:
1. The intellectual content is expressed in his arguments. He calls her to awaken because:
   (a) the lark is singing,
   (b) the sun is rising,
   (c) the flowers are opening,
   (d) everything that is pretty is rising,
   (e) it is time, therefore, for *you* to arise.
2. The emotional quality is expressed as follows:
   (a) The stimulating beauty and the joyousness of the morning, as felt by the lover, is expressed by:

i. The magnificent imagery in which his arguments are clothed;

ii. The exhilarating rhythm.

(b) His love for his lady is suggested in:

i. "With everything that pretty is,"

ii. "My lady sweet."

3. The keenness of his desire is shown by the use of the staccato calls:

(a) "Hark, hark!"

(b) "Arise, arise!"

Function and Structure in Arithmetic.—Arithmetic affords an excellent example of units of subject-matter which have a very definite function and a very definite structure. For instance, if we start with the function of arithmetic, and state it to be the providing of methods for measuring quantity, we can at once see how the different processes assist in fulfilling this function. For example, the function of addition is to provide a means for securing the sum of like quantities. The function of multiplication is to provide a short method of adding, and the function of the multiplication table is to facilitate the process of learning the multiplication facts. The function of fractions is to provide a means of computing quantities whose unit is less than 1; and among these we have decimals with the function of providing a peculiar and easy method of handling all fractions having as denominator 10 or a power of 10. In the same category come denominate numbers whose function is that of providing a method of handling quantities whose units are what are technically known as "measures." Similarly, percentage has as its function the manipulation of certain quantities which can be handled most easily by computing them in terms of 100. A promissory note has for its function the recording definitely in writing of a promise to pay. Interest has as its function the computing of the amount to be paid for the sum borrowed. In the same way, each of the processes of arithmetic may be shown to be a tool whose function, or purpose, or use is to help in the computation of arithmetical quantities.

Furthermore, each of these processes has a structure, that is, a way of working which helps to carry out its function. If we examine addition we find that we have integers and decimal notation to carry it out. Multiplication is constructed with its integers, its decimal notation, and its dependence upon memory for the sums of certain like quantities, by which it performs efficiently its work of shortening addition. Likewise, the promissory note has many ways of safeguarding the transaction of borrowing money, such as the date and time to run, the rate of interest, the amount written in words as well as figures to avoid error, and the signature of the borrower. These which make up the structure of the promissory note all help to make it a safe method of recording financial transactions.

And so with every process. The function being determined, the structure follows freely. The teacher should take every process in arithmetic and view it in this functional way, so that each will be viewed as an instrument which has its own peculiar value in certain surroundings. For, just as the tack hammer can do certain work better than the carpenter's hammer, so the carpenter's hammer can do better work in some conditions than the trip hammer. Each of the processes of arithmetic has its own peculiar field to work in, a field in which it is of most service and most easily applicable. Each process is a tool just as much as a hammer is a tool. And, further, just as the tack hammer has one kind of structure because its function is to drive tacks, while the trip hammer has another structure because its function is to crush steel, so it is with each process in arithmetic. Each has its own way of acting, its own structure which has been built up by the race with infinite care to perform the work for which it was created.

Spelling.—

rare	worthless	willing
exit	disperse	rejoicing
plenty	sullen	separate
advance	miser	money

Function: To provide an exact form by which to symbolize the idea for which each word stands. *Rare* has thus the function of symbolizing the idea "rare." *Exit* has the function of symbolizing the idea "exit," etc. Each thus has a different function.

Structure: These words are built up by the organization of letters which unfortunately do not follow any logical order. Their structure has been determined by convention, and has to be accepted as it is. The structure consists in each case of the letters as arranged by convention.

believe	receive	reprieve
grieve	achieve	sieve
conceive	retrieve	sleigh
feign	deceive	neigh

Function: To provide an exact form by which to symbolize the idea for which each word stands.

Structure: The structure of the words follows a definite rule (with exceptions) with regard to the order of the i and the e. That is to say, the order of the i and the e is determined by the following rule: "i before e, except after c, or when pronounced like a, as in neighbor, and weigh."

Section 2. In the Organization of New Subject-Matter the Function Is First Determined and the Structure Is Built Up to Perform the Function

English History.—It is, of course, clear that the method of organizing units of subject-matter *de novo* should be the same as those which have been found in subject-matter already effectively organized, and illustrations of how this may be applied to history and theme-writing will be sufficient. In the first place, the function of the whole course is decided upon. Let us suppose that in English history we wish to make the subject-matter serve the function, inadequate though it be, of showing the rise in governmental power of the common people of England. When we proceed to organize our subject-matter we have a well-defined line to which to hew. There is a vast array or accumulation of facts which are of interest, some for one purpose, some for another. But we may choose only those events which had an influence upon the rise of the common people in governmental power. We can, for instance, determine to what extent and from what standpoint to study the wars of England. For example, we would be concerned very little with the battles of the Hundred Years War, but would lay great stress upon the effects of the war in modifying the political power of the common people. We would profitably omit all the Wars of the Roses except the decisive battles, and would retain those only as fitting centers around which to collect the political influences of the wars.

We can also determine the characters in English history upon which to lay most stress. The character of Simon de

Montfort might receive more attention than that of Piers Gaveston. We are able, too, to determine the elements of the characters of the different sovereigns upon which to lay stress; for instance, those characteristics of King John which most angered his people would be most important, those characteristics of Richard I which enabled his people to gain more power would be significant ones, and those characteristics of Charles I which made the people restive under his authority should be selected. We see why certain periods should be emphasized and other periods treated briefly. For example, the period from 449 to 900 A. D., the reigns of Henry I, of Henry II, and of John, the Stuart period, and the period immediately preceding and succeeding 1832, should be treated fully in their political aspects. On the other hand, the Yorkist and the Tudor periods should receive relatively less attention.

The teacher then knows, and the children know, that their reason for studying the tenth lesson, or the twenty-fifth lesson, or any lesson, is to see how the growth in political power of the common people was affected by the events portrayed in that particular unit. And the pupils at the end of their study of English history should have their subject-matter organized in such a way that they can trace the development of this power from 449 A. D. to the present time, and state the conditions which have influenced the development, step by step.

Two things may be said in relation to the foregoing treatment of English history. (1) It is not necessary for us to assume that this is the best function that English history can serve. The points are these: the function must be determined, whatever it may be; and the teacher and pupils should have that objective point before them continually. (2) In so far as there are other facts in English history which may be of value but which have yet had no appreciable effect upon the determined function, they may be noted, but they should be recognized as being incidental and relatively isolated from the trunk line of study.

Theme-Writing.—In writing a paper upon any topic the first step is to determine the problem which the paper intends to solve, or, stating it in terms of subject-matter, the function of the subject-matter which is about to be organized. Then the pupil has to think out the main arguments or steps that he will use in solving this problem, and these will form the skeleton of the paper. Then each of these main arguments must be studied in detail to get facts to support it. Thus a more detailed outline for the paper is obtained and the paper will be completed by connecting the arguments and massing the details in appropriate language. Here, again, the function is of supreme value. It gives the standpoint from which to select subject-matter, and indicates the standard by which to judge the logical quality of the paper; for the function will check up every point, even to the minor ones, since anything irrelevant to it must be excluded, and everything that is relevant and reasonably within the experience of the pupil is expected to be inserted.

Section 3. The Same General Subject-Matter May Have Different Functions with Correspondingly Different Organizations

Arithmetic.—The principle which is stated at the head of this section may be illustrated as follows: If we take the Fodder Tables and the Tables of Nutriment for a Day's Feeding and select a few facts, it is an easy matter to show how these may have different organizations when fulfilling different functions.

Fodder.	Pounds.	Dry Matter.	Protein.	Carbohydrates, etc.
Corn stover	10	5.95	.17	3.24
Clover hay	10	8.5	.71	4.2
Corn meal	1	.85	.063	.71
Cottonseed meal	1	.9	.45	.4
Wheat bran	6	5.1	.38	4.3

These figures refer to the constituent food products selected. For instance, 10 lbs. of clover hay contains 8.5 lbs. of dry matter and in the dry matter is found .71 lb. of protein and 4.2 lbs. of carbohydrates, etc.

It is known, further, that (a) a milch cow weighing 1,000 lbs. and producing 22 lbs. of milk per day requires 29 lbs. of dry matter, including 2.5 lbs. of protein and 13 lbs. of carbohydrates per day, and (b) beef cattle from 18 to 24 months old, weighing 950 lbs., require per day 22.8 lbs. of dry matter, including 1.71 lbs. of protein and 11.4 lbs. of carbohydrates.

These seven facts may be organized differently, some being used in one proportion and some in another, some being omitted and others utilized. For instance, if we wish to make a balanced ration for each of the kinds of cattle mentioned, we may have different organizations, in detail as follows: *Function:* To make a ration for the milch cow referred to above.

Structure:

Fodder.	Pounds.	Dry Matter.	Protein.	Carbohydrates, etc.
Clover hay	10	8.5	.71	4.2
Corn stover	10	5.95	.17	3.24
Corn meal	4	3.4	.26	2.86
Wheat bran	5	4.4	.6	2.40
Cottonseed meal	2	1.8	.9	.8
Total	31	24.05	2.64	13.5
Standard	..	29	2.5	13

This provides a satisfactory balance of ration (slightly light in bulk). It is, therefore, an organization that fulfills its function.

For the second kind of cattle another organization of the fodder constituents is possible, as follows;

Function: To make a ration for the beef cattle referred to above.

Structure:

Fodder.	Pounds.	Dry Matter.	Protein.	Carbohydrates, etc.
Corn meal	8	6.8	.48	5.7
Cottonseed meal	1	.9	.45	.4
Clover hay	10	8.5	.71	4.2
Corn stover	5	2.97	.08	1.62
Total	24	19.17	1.72	11.92
Standard	..	22.8	1.71	11.4

This slightly different organization is made by the selection of another function to be fulfilled.

Geography.—Suppose we take the following problem: What are the effects of the motions of the earth relative to the sun? In a general way, the subject-matter organized to answer this question may be considered to be composed of three facts: (1) the earth revolves around the sun in the plane of its orbit, once a year; (2) it revolves on its own axis once a day; (3) the axis of the earth is inclined 23½° from the perpendicular to the plane of the orbit.

Now, this subject-matter may be made to serve two purposes, among others.

(1) *Function:* To explain the cause of the seasons.

Structure: If we take any point upon the earth's surface, it is evident that in the revolution of the earth around the sun there will be one time in the year when the rays of the sun are more nearly perpendicular to that point than at any other time. The sun's rays are most effective when they are perpendicular, and this gives rise to summer. At another time of the year, when the earth is at the other extreme of the orbit, the rays fall most obliquely on that same point. Under these circumstances the heat rays are less effective, and this gives rise to winter. There are two periods during which the sun's rays are inclined at angles half way between these two extremes. The one of these that follows summer is fall, which is warmer than winter and colder than summer, and the other is spring, which is also warmer than winter and colder than summer.

(2) *Function:* To explain the fact that the days are longer in summer than in winter.

Structure: Consider any point in the northern hemisphere. In summer the sun's rays reach beyond the north pole, and will cover more than half the northern hemisphere. As the point revolves around the earth's axis, it will be in the sunlight more than one-half the time. Hence the days will be longer than the nights.

In these examples the three facts that were stated at the beginning, when amplified and illustrated sufficiently, as in text-books on geography, usually contain the facts stated in the solution of the two problems. The point to be emphasized is that we may, if we so desire, take the organization of subject-matter made to fulfill an encyclopedic purpose and approach it from different standpoints, as in the instances just given. And a different organization of the original subject-matter will result as each of these different problems is successively in mind. In such cases we get a new organization by laying emphasis upon certain of the facts and subordinating the other facts found within the larger organization.

Literature.—That a selection in literature may have different functions is very well exemplified by the well-known poem, *Excelsior*. From one standpoint, the function may be to illustrate the persistence of an ideal; from another standpoint, and this the standpoint of young children, it may be that of portraying the adventures of a remarkable youth. Upon the first basis we are fortunate in having Longfellow's[1] own statement of the purpose of the poem. (The author's statement is indicated by quotation marks.)

(1) *Function:* "I have had the pleasure of receiving your note in regard to the poem, *Excelsior,* and very willingly give you my intention in writing it. This was no more than to display, in a series of pictures, the life of a man of genius, resisting all temptations, laying aside all fears, heedless of all warnings, and pressing right on to accomplish his purpose.

Structure: "His motto was 'excelsior'—and 'higher.' He passes through the Alpine village—through the rough, cold paths of the world—where the peasants cannot understand him and where his watchword is an 'unknown tongue.' He disregards the happiness of domestic peace and sees the glaciers—his fate—before him. He disregards the warnings of the old man's wisdom and the fascinations of woman's love. He answers to all, 'Higher yet.' The monks of St. Bernard are the representations of religious forms and ceremonies, and with their oft-repeated prayer mingles the sound of his voice, telling them there is something higher than forms and ceremonies. Filled with these aspirations, he perishes, without having reached the perfection he longed for; and the voice heard in the air is the promise of immortality and progress ever upward."

The analysis from the second standpoint might proceed somewhat as follows:

[1] Longfellow's *Poetical Works,* Vol. 1, pp. 79 and 80, Houghton, Mifflin & Co., 1892 edition.

(2) *Function:* To describe the adventures of a lonely, peculiar youth in climbing an Alpine mountain.

Structure: 1. Stanzas 1 and 2 show his loneliness by the terms 'strange device' and 'unknown tongue,' and his peculiarity is shown by his carrying a banner, his sad brow, and his flashing eyes.

2. Stanzas 3 to 9 tell of his adventures.

(a) Stanza 3—he passes homes, and his loneliness and peculiarity are shown by the fact that he sees the comforts of homes, but, even though he is so lonely that he groans, he passes them by.

(b) Stanza 4—he meets an old man, and again his peculiarity is shown in his paying no attention to the dangers ahead.

(c) Stanza 5—he meets a maiden; again his loneliness is shown by the tears that come to his eyes, and his peculiarity by his still pressing on, though with a sigh.

(d) Stanza 6—late at night he meets a peasant, who warns him of other dangers. His peculiarity is shown again in his still pressing on.

(e) Stanza 7—shows him in the morning, away up the mountain-side; his loneliness is shown again by the expression, 'the startled air.'

(f) Stanza 8—depicts him as finally dying, alone, frozen; and his peculiarity is further shown by his still grasping the banner in his hand of ice.

(g) Stanza 9—again shows the strangeness of the youth, in that, as he lay there, a strange event occurs, "that from the sky a voice fell like a falling star, Excelsior."

It is undoubtedly true that many children who read the poem, *Excelsior,* appreciate only this latter rather meager function. But waiving the question of the advisability of teaching the poem to children who get nothing more than this out of it, it furnishes a good illustration of how literature may serve some other function than that which the author primarily intended.[1] Oftentimes in the exposition of his deeper meaning he uses illustrations and allegory, which to the discerning mind are seen to be merely the vehicles of his meaning, but which to one not so discerning become the whole content of the idea. An excellent example of this allegorical presentation of meaning is furnished by Bunyan in *Pilgrim's Progress.*

[1] See Chapter III.

CHAPTER VII

THE HIGH SCHOOL COURSE OF STUDY

Section 1. Factors in the Selection of Subject-Matter

The course of study is usually discussed in educational administration rather than in methods of teaching, because the latter in the last few years, during which the fields of educational theory have been in a process of differentiation, has been investigating methods of presentation of subject-matter, to the partial neglect of the organization of subject-matter. But subject-matter is an essential factor in the teaching process and right methods are conditioned by right subject-matter, hence, it is evident that the selection and organization of subject-matter may be appropriately discussed in methods of teaching. Consequently, a chapter on the high school course of study is introduced here to round out our discussion of subject-matter.

The theory of organizing a high school course of study is extremely easy of statement, although the working of the theory over into practice is difficult, since we have little scientifically accurate data about pupils of high school age. This lack of accurate data causes a good deal of mere conjecture and of reliance upon individual opinion in the determination of a course of study. Consequently, the course of study suggested in this chapter must be considered to be purely tentative, subject to modification at the hands of those whose opinions differ from those of the writer.

But while the course of study is subject to opinion, the general method of selection is pretty well substantiated by writers upon education and its allied subjects.

The Pupil as a Factor in Selection.—The *first* factor that enters into the selection of subject-matter for any course of study, elementary or high school, is the needs of the pupils. For, since teaching endeavors to give the pupil control of his values and the appreciation of values not yet his own, it is necessary that the course of study be fitted to his system and scheme of values in a rather intimate way. The subject-matter the race has worked out cannot fall like an avalanche upon him. It has to be adjusted to his appetite in order that it become assimilated.

The high school pupil has four characteristics that are relevant to our problem. In the *first* place, he has many active needs and interests, as any person can see without difficulty who watches high school boys and girls and becomes intimately acquainted with them. They have problems of their own, intellectual, social, and moral. Adolescence is the peculiar time of religious conversion. All these ought to be understood, but unfortunately they have not been extensively studied and are not well known. Practically all the work that has been published has been done by Hall and his pupils, for a résumé of which the reader is directed to Hall's *Adolescence*.

In the *second* place, high school students are suggestible and can frequently be made to feel the need of certain kinds of subject-matter in which they have not up to that time been actually interested. This can be done within certain limits. The practical high school teacher can recall many instances in which a worthy interest in new subjects and materials has been stimulated; and can recall many instances in which it seemed impossible to secure interest on the part of some of the pupils in certain subjects. The teacher who recalls instances of failure usually blames himself, but, while the fault may be justly laid upon the teacher's methods, it is only partly his. Either or both of two other factors may cause failure; viz., limitations to the range of interests of the pupils, and of available subject-matter. They may not have had the capacity for interest in the subject at that particular time. Possibly or probably it would come later, but it is beyond calling range at this stage of the pupil's development.

In the *third* place, because the adolescent has passed the limits of physical and psychological childhood upon the acquisition of sexual maturity, he has acquired capacity for understanding and appreciating most of the problems and attitudes of *adult* experience. Hence, in a rudimentary way he is capable of becoming interested in all the more fundamental aspects of adult life. He can appreciate now quite vividly, though not with clear intelligence, the social, political, economic, religious, and moral questions of society. Being not yet by any means mature, he does not have the adult's soberness and persistence, but he feels the problems in his vague and spasmodic way, and he is prepared to take on the study of subjects in which in pre-adolescent days he had no interest and for which he could be made to feel none.

In the *fourth* place, this lack of maturity, together with certain other factors, causes him to study popular rather than scientific facts. Popular science is more attractive than systematic science. He is interested chiefly in such physics as will suffice to explain why objects work as they do. The systematic study of the theory of electricity he is not yet prepared for. He picks up his sciences in scraps, the scraps being those facts which explain the workings of the common objects that surround him.[1]

The average adolescent, then, may be assumed to be most interested in those things which touch his daily life, now widened to take in the fundamental problems and processes of the popular—not scientific—society in which he lives. He is not a "student," nor a "scientist"; he is a "practical man," with his practical interests wider than they will probably ever be again, after the narrowing effects of a selected occupation have had a chance to be felt.

Racial Subject-Matter.—The *second* factor entering into the organization of a course of study is racial subject-matter—the fields of knowledge that have been worked out in systematic form by the race. Each of these subjects has an intrinsic function, and certain indirect results follow from their study. They are at the command of the teacher who can utilize them in helping the pupil to control his values and to appreciate new ones. Hence, it is necessary that the teacher know the intrinsic functions of each subject, so that the pupil may be brought into contact with each, or divisions of each, at propitious times when the appropriate need is present or is standing just outside the door, waiting to be invited in. The determination of these interests and attitudes of the adolescent, unlike the determination of the needs, is capable of exact definition, as illustrated in the three preceding chapters. And such definition is necessary as a step in the organization of a high school course of study.

Section 2. Details of Selection

Necessity for Selection.—The two foregoing factors determine the selection of subjects and their organization

[1] Hall's *Adolescence*, Vol. 2, Chap. 12.

into a course of study. Some selection is necessary: not all subject-matter and not all of any subject should be taught in the high school. This is true for four reasons.

First, some of the subjects are taught in the grades and have no place in the high school. Among such subjects are writing and spelling. In so far as they have a place in the high school, it is because habits not yet fixed need to be trained.

Second, there are legal objections to some subjects in certain countries, such as the teaching of religion in the public schools of the United States.

Third, there are so many subjects that may be taught, that all cannot be handled in a four-year course in which the student may at most study only from thirty-two to forty of these for a half-year each.

Fourth, as pointed out above, there are limitations to the active or potential needs of the adolescent. But this, however, is not serious if attention is paid to fundamental subjects. A specialized subject, such as a foreign language, or any other subject taught from the point of view of the specialist, may not evoke interest, but a fundamental, such as metaphysics, even, taught from the popular standpoint, and its facts selected from a non-technical point of view, is of surpassing interest to that most inveterate of metaphysicians, the adolescent.

Starting Points in Selecting.—The selection may begin from either of two directions. In the *first* place, the teacher may look over the whole field of racial experience, may view the whole "field of knowledge," and select from each of its great divisions subjects which are typical of those divisions. He will secure a list in which there will be a physical science, a biological science, some division of history, some foreign language, some mathematical subject, etc. In his selection from among the representatives of these fields he will, of course, be guided by the ability of the pupil to grasp them, and this extent, at least, will combine the two factors, racial subject-matter and the pupil.

The advantages claimed for such a method of selection are, *first,* that it trains the pupils in the methods of investigation utilized in the great departments of knowledge, methods so valuable that their possession by the race engenders justifiable pride. *Second,* by this acquaintance with the great fields of knowledge, the pupil frequently discovers new interests of which he had been hitherto unconscious, interests so intense and persistent that his future occupation is sometimes determined by them. *Third,* whether it has such a distinct effect upon his life or not, this introduction to all fields of knowledge makes the pupil an all-rounded individual both in his information and his interests, and counteracts perpetually the narrowing influence of a later specialized life occupation.

However, in selecting subject-matter we may start in from the other end and begin with the needs of the pupils. The initial question is asked, What are the needs which high school pupils have and of which they may be made conscious? From among these the fundamental types are selected. Then the subjects are selected whose intrinsic functions are able to satisfy these needs.

The advantages claimed for this method of selection are as follows: *First,* a strong motive is given to all work, since pupils, according to the assumption of the point of view, feel a deep interest in these fundamental problems and their solution. *Second,* not only is there a strong motive for the study of the subject, but the principles studied are understood better, since they deal with problems to which the students have already given some thought. Perhaps, the thinking has not been either accurate or definite, but enough has been given to produce a familiar "feeling" in connection with the situation. *Third,* since the subjects studied will thus be connected with fundamental needs, and since fundamental needs are in the main closely related to fundamental types of conduct, the study of the subjects will directly influence practical conduct.

The Net Result.—The question arises, Do we not come out at the same place by starting at either end? By starting with the great types of subject-matter and selecting the most important, may we not define importance in terms of fundamental needs, saying that the most important are those which satisfy the most fundamental needs? And is that not exactly what we do when we select the fundamental needs first and select the appropriate subject-matter afterwards?

The question, then, is whether relative importance among the fields of knowledge is determined by the same standards as is the relative importance among needs and interests.

In the world of knowledge, the importance of a field is determined in *actual practice,* partly by the importance of the problem, but much more by the progress made in the solution of the problem. Among many important fields, that one has relatively greater temporary importance in which there has recently been "something doing." Even in universities which are not supported by the state, and thus are not subject to legal restrictions, science is commonly considered by the average student or instructor to be more important than religion. To say, however, that science satisfies a more important need than does religion, would not be acknowledged by as great a preponderance of opinion. Importance is not a scientific matter. It is a matter of belief and feeling mixed with arguments. Hence, in answer to the question, Entering from either end, do we come out at the same place? we may say, "Not necessarily."

And as a matter of fact, we do not, in practice. Among the subjects which are required in a high school course of study are foreign language, algebra, and geometry. They are justified as being subjects about which everybody *should* know, representatives of two of the great fields of human thought. But they are in the course of study because of the innate conservative strain in the high school system—it is absurd to claim that they solve such fundamental needs that they should be required of everyone.

Required Subjects and Electives.—In this chapter, then, it is proposed that we enter from the pupil's side and utilize the subject-matter as required in connection with his active needs and desirable potential interests.

There are in a course of study two classes of subjects,—required and elective. These vary, but in the main they include, in practice, a minimum of three units of English, one each of algebra and geometry, and two of a foreign language.

The principles upon which required and elective subjects may be determined are these: Those subjects should be required which handle problems and needs which every person, irrespective of occupation or individual bias, will have to solve and satisfy; those should be elective which appeal to the interests of individuals, because of temperament or intended occupation.

In the remainder of the chapter a few subjects will be suggested which seem to be of prime importance. The list is not necessarily complete, and the amount of time to be given to each is not determined.

It has not been worked out in detail, because, when completed, there is of necessity so much of opinion in the whole proposition that a scientifically accurate list cannot be made. This list is given rather as an illustration of how the principles might be applied than as one whose details are beyond question.

SECTION 3. TENTATIVE LIST OF REQUIRED SUBJECTS

The principle of selection for the list of required subjects is this: Those subjects which deal with fundamental problems and needs with which each individual, irrespective of personal bias or occupation, has more or less to do. Pick out those subjects which a man, as a social being surrounded by others, will be helped by, and make them *required.* Let each pupil *elect* subjects that will fit him for business, for college, or for his own peculiar pleasure. Upon such a basis the following list of required subjects is presented:

1. English Composition — unless well taught in the grades.
2. Politics and Government; for all pupils will be expected to vote, when the franchise is extended to women, they can with difficulty get the unbiased facts from the newspapers, which for the most part are partisan.
3. Sociology—since preventive philanthropy, the relations of capital and labor, prevention of crime, etc., are among our greatest modern problems.
4. Art—including enough of architecture to build an unobjectionable house, enough of color appreciation to decorate it fittingly inside and out, enough of landscape gardening to beautify the grounds, literature sufficient to appreciate the deepest emotions expressed in fitting terms, and of music to secure relaxation and enjoyment.

5. Application of biology, chemistry, and physics to the problems of adulteration of foods, common animals and plants, electric bells, and other practical matters.
6. Domestic science and art for women whether they will have to do their own housework or not, enough knowledge of adulteration and quality of textiles to enable them to avoid judging quality by price, enough knowledge of sewing and millinery to plan and make their own clothes, if necessary, etc.
7. Physiology for young men and for young women, in which will be taken up the problems of sex-hygiene, household sanitation, infection, contagion, etc., taught in segregated classes.
8 Economics sufficient for business purposes, including the fundamental theories of money, credit and banking, distribution and consumption, taxation and transportation.
9. American history for American schools, used as part of other subjects to give them background and systematically to give a clear idea of the evolution of our great American problems.

It will be noted that this does not include either algebra, geometry or a foreign language. The reason for the omission is that they do not cater to any fundamental needs. It does not include ethics because the writer believes that the values in that field can best be taught incidentally.

Certain objectors will say that a little sociology or economics in the high school is dangerous because these are really subjects for adults. But in answer, *first,* almost every specialist makes the same claim about his own subject in the high school, and it is true if one wishes to teach a system of principles.

But it is not true if it is presented bit by bit in explanation of practical and familiar problems. *Second,* the pupils have to meet these problems and meet them squarely. Only a small proportion go to college, and if they do not get a knowledge of them in the high school they must pick it up for themselves. A half loaf is better than none.

References for Class Reading

Hall, *Adolescence,* Vol. 2, pp. 153-159.

De Garmo, *Principles of Secondary Education,* Vol. 1, pp. 27-52.

Exercises

1. Give five instances of where pupils with a distaste for algebra, Latin, literature, or physics finally become intensely interested in it.

2. Can the average pupil be made interested in any subject under a good teacher?

3. If a pupil can be made interested in a subject, is that sufficient reason for its being in the course of study? Why?

4. What do you think of the statement that the adolescent is an inveterate metaphysician?

5. What is the difference between science taught as *popular* and as a *systematic* science?

6. Can laboratory work be done if the science is taught *popularly?*

7. Can magazine articles be used in a subject taught from this point of view, without cheapening the course?

8. What are the objections to the plan of required subjects as outlined here?

9. Should a vocational subject be required? Why?

10. What difficulties would arise from teaching politics and government in the high school? They are taught in

colleges as political science and no serious objection is made. Is the case different in the high school?

11. Should the university prescribe what subjects will be accepted for entrance, or should it accept anything that is well taught in the high school?

CHAPTER VIII

THE TEACHING OF SUBJECT-MATTER

Section 1. The Problem of Teaching

We teach when we assist the learner to get control of some worthy value. This learner is interested in doing things. When he comes to a point where he needs assistance and asks for it, we teach him. But, in order to help him, we must know what he is doing, what terminology he uses, and what his attitudes and biases are. In other words, the teacher must not only know how to do things, but, in addition, must know the content of the experience of the one taught. A Frenchman can with difficulty teach an Italian in French words if the Italian knows no French. The Frenchman should speak in Italian. Children's meanings are almost as widely different from those of adults as French language is from the Italian.

This makes evident at once the distinction between carrying on activities and teaching others how to carry them on. For instance, when the housewife proceeds to teach an untrained servant how to make bread, the process of teaching differs from the process of breadmaking in that the housewife, as teacher, has to translate what she does into terms of the experience of the one taught. We say ordinarily that she has to make the servant understand. But this means that the making of bread has to be stated in terms of what the learner already knows.

Difficulties.—That this is sometimes a difficult thing to do becomes evident when, in terms of the foregoing illustration, we think of the mistress endeavoring to teach an untrained domestic. The domestic either has very little content of experience; i. e., is ignorant, or she is so different from the mistress that the latter cannot get an understanding of what she really does know and think. To illustrate further, take the case of the specialist in science who endeavors to teach. He may be able to solve the problems of his laboratory with the greatest skill possible, but that does not necessarily mean that he can *teach* his methods with equal success, for the new element enters; viz., that of translating his methods over into the content of the mind of the learner.

It must be acknowledged that with many people who teach, the real problem of teaching does not arise. That is to say, they merely state the process by which they arrive at conclusions, if the problem is an intellectual one; or merely perform their methods, if the problem is a manual one, and make no effort to translate the thing they are doing into the experience of the learner. In this case one of three results follows. The learner may not at all grasp the teacher's method of doing things. Or, he may grasp it at once because the content of his experience is like that of the teacher. Or, after a process of hit-and-miss understanding, he may finally come to a point where his content is sufficiently like the teacher's to enable him to understand the teacher's methods. The teacher remains in his own world, and to the pupil is relegated the duty of coming into that world.

This explains why the teacher who as a student was quick or brilliant is frequently less successful in the beginning of his professional career than is his companion to whom learning was a much more difficult process. The latter is nearer to and better understands the content and ability of the minds of his pupils. This also explains why the teacher with intellectual and emotional sympathy has an advantage over the teacher who cannot appreciate the standpoint of other people. The former has the habit of feeling with the pupil, the latter has the habit of living within his own world. Some teachers are born with an intuitive feeling for the standpoint of children, others have to achieve it by laborious effort, and still others fail to attain it.

Section 2. Characteristics of Pupils

Individual Differences.—That children differ one from another is a fact patent to any and all observers. These differences are the special pride of parents when discussing their offspring. Our system of uniform instruction in classes, however, tends to minimize these differences and to overemphasize the similarities. This tendency to teach children in mass as though they were all alike is almost irresistible. Yet the differences are great enough to deserve careful consideration.

Thorndike has made an analysis of these differences between individuals in his *Principles of Teaching*, pp. 68-98.[1] He finds that children differ in amount of specific abilities and that small differences are of greater frequency than larger ones. That is to say, in a well-graded class most of the children are close together in mental ability, but there are always some who are much better or much poorer than the average. "The worst error of teachers with respect to individual differences is to neglect them, to form one set of fixed habits for dealing with all children, to teach 'the child' instead of countless different living individuals.

[1] Also, monograph on *Individuality*, 1911, Houghton, Mifflin & Co.

To realize the varieties of human nature, the nature and amount of mental differences, is to be protected against many fallacies of teaching."

The general mental constitution of pupils he finds to be of three loosely defined types—intellectual, emotional, and active. "Given any situation, some children will tend to think it out, others to respond emotionally, and still others to do something. Propose to a class that instead of two sessions a day a single session lasting from nine till two be held. Some children will argue pro and con; others will cry out, 'Oh, that will be fine!' or, 'I don't like that at all'; others will go to work to persuade their parents to vote in favor of one side or the other, will start petitions and the like."

There are two intellectual types among children—those that work with ideas, and those that work with things. "Some children manage numbers, words, parts of speech, chemical symbols, and the like, but fail relatively in measuring boards, catching fish, cooking meats, or making toys. They are the *idea thinkers.* Others make little headway with their arithmetic, grammar, or text-book in chemistry, but succeed in the shop, the woods, and the laboratory. They are the *thing thinkers.* There is, however, no opposition between these two types; indeed, a high degree of skill with ideas means a higher than average skill with things. Still, for practical purposes we can classify children by their special strength into these two groups."

Some pupils are predominantly visualizers, others audiles, and still others motiles. This is very well illustrated in spelling. Some children remember spelling best by looking at the words. They have a visual picture of the letters. Others remember best the sound of the letters. Still others remember the correct spelling only after writing it out or after spelling it to themselves, thus getting the muscular feel in the hand or in the vocal cords.

Then, again, some pupils are impulsive, while others are very deliberate. "A teacher must not irritate the former by forever checking their natural tendency to jump at actions, or the latter by hurrying them on to what seem to them impossibly hasty decisions. Too vigorous opposition to their natural bent will only make the one class confused and sulky, and the other nervous and tearful. We must, by sympathetic and ingenious treatment, bring each toward the golden mean of action that is neither rash nor tardy.

"As with all other capacities, there are wide differences between children in the degree of suggestibility. Ask Mary, 'Why is your work so poor today? Have you a headache?' and in a half-hour Mary will be making more mistakes than ever, and will have a headache, whether she had one before or not. Ask Jane the same question in a similar situation, and the reply is a prompt, 'No, Miss ———. My head is all right. I just didn't study this much.' The means of allowing for and of utilizing these differences are either too obvious to need comment, or so dependent on ingenuity rather than principle as to be learnable only through practice.

"Individuals may be graded into groups with respect to the speed, vigor, and range of their mental processes, on scales of quick to slow, intense to weak, and broad to narrow. Teaching must, of course, make allowance for these differences. Some first-rate thinkers are puzzled and discouraged by rapid questions or drills. Some children think and feel so intensely that they need the bit of calmness, humor, and relaxation rather than the spur of excitement or rebuke. Some children cannot think of more than one thing at a time, and are lost in a lesson if the teacher introduces side issues or comparative references which the broader-minded child follows easily.

"Individuals may also be graded according to their mental balance, their ability to see things in proportion, to think and act with common sense. In little children these differences are not so obvious as they become during the high-school age. At that period it is easy to recognize the lack of mental balance shown in complaints about teachers, irregularity in school work, the presence of eccentric notions, and inability to get on with parents. The lack of mental balance in parents themselves is, needless to say, one of the greatest obstacles in the teacher's path.

"A practically important series of differences in temperament concerns the qualities of hopefulness and suspicion. People, even as children, differ greatly in their expectation of success and satisfaction with what is, apart from any logical basis. Some always think their affairs are to turn out well, and think whatever they do or have or see is fine; their clothes always fit them—mentally at least; their lessons are always well done—in their opinion; nothing can disturb their imperturbable satisfaction. They verge toward the delusions of grandeur found in the insane. At the opposite extreme are those who always have a grudge, who feel put upon, who are ready with a tale of injustice to them, who are sure the world is a hard place. In school they are forever apologizing, or sulking, or complaining; in perfect kindness they see some slight, in perfect health they find some flaw. These verge toward the delusions of persecution of the insane. Both groups need to learn to judge objectively by facts, not subjectively by their feelings about them."

And finally, there are differences of attitude and ways of working due to sex which become apparent early in school life.

All of the foregoing differences may be found in almost any group of children of the same grade in school, and they are important for the teacher to reckon with. It is not possible, of course, to fit the course of study to each one, since they must be handled to a great extent in mass, particularly in large classes. But if the differences are known and utilized, the teacher is able, on the one hand, to fit the work more intelligently to the normal pupils, and, on the other, to deal sympathetically with those children who deserve and need special attention, either because they are brighter or slower than the majority.

Genetic Differences.—But children differ as well from year to year. There is, of course, a very noticeable difference between a six-month babe and that same babe twenty years later.

If we could know definitely the general constitution of the minds of children in each of the grades of the elementary and high schools, we should then be able to intelligently arrange our course of study so as to fit the dominant characteristic of each grade. If, for instance, we know definitely what instincts are dominant in the fourth grade, we would be able to know what sort of reading material to give, what approach to make to geography and history material, and what sort of industrial work to carry on.

This is "a consummation devoutly to be wished" but at present far from realization. Much work must yet be done before we have anything sufficiently definite to be relied upon. Several attempts have been made, but there is no body of reliable data at hand which will establish any one classification and refute the others. We need to have a wide range of statistical observations and many intensive studies of individual children before the facts will be sufficiently numerous to establish any generalization.

Available Instincts.—Pyle[1] says upon these points: "If we could make out a table showing the orderly appearance of the instincts and the periods of their dominance, we could then arrange the curriculum of the schools to correspond to these instinctive activities. But the matter is not simple. The time of first appearance of the various instincts varies much according to the reported observations, and their periods of dominance vary still more. The appearance of an instinctive action, even after the structures are ready for it, depends upon the appearance of the situation that normally calls forth the particular form of response. There is a variation of a year or two in the maturing of the structures that underlie the instincts. And even after the first appearance of an instinct, the future course is entirely dependent upon experience. An instinctive tendency may be early subdued, or it may be strengthened and perpetuated. The nearest we can come to a solution of the problem is to determine by statistical studies the time when, on the average, an instinctive tendency is at its height, and in some cases this may be sufficiently definite to be of value to education. But only in a broad way can the instincts determine the order of the curriculum. The individual, adaptive, and environmental instinctive tendencies are all operative when the child enters school, and can be depended upon to furnish motive and initiative. The social tendencies are also operative and grow in strength steadily till maturity.

The fact is that other factors are more important in determining the arrangement of the curriculum. As far as his instincts are concerned, we may teach a six-year-old

[1] *Outlines of Educational Psychology,* pp. 246-7.

boy about stars, bugs, flowers, weeds, stones, rivers, and mountains; and wise teaching doubtless teaches something about all these things from the beginning. Since the appearance is variable, and since the strength of instinctive tendencies is dependent upon experience, and therefore varies immensely for different individuals, the teacher will have to ascertain for each individual case what instinctive tendencies will function best to furnish initiative and motive. At any rate, the instincts will have to be taken into the laboratory and worked out with a great deal more care than has ever been used in their study before we can do anything more than indicated. However, it may be worth while to give in brief form the results of various studies of instincts and the emotive instinctive responses:

Imitation.—First appearance, 59th day (reflex), 171st day (voluntary), Dearborn; in second half of first year, Kirkpatrick; 6th or 7th month, Baldwin; 15th week, Preyer; 237th day, Major; 4th month, Sully. Most prominent 4th to 7th year, Kirkpatrick.

Play.—In the second quarter of first year, Kirkpatrick, Major, Shinn; 341st day, Dearborn. Normally, always operative later.

Migrating.—First to 3rd or 4th year, Kline; 2nd or 3rd year, Kirkpatrick; must be subdued by early adolescence or may become permanent tendency.

Collecting.—Not later than the 3rd year, Burk; in the 2nd year, Kirkpatrick; at its height at 10, Burk.

Construction.—Appears 9th month, Sully; 13th month, Tiedemann; 14th month, Major. Interest in construction is prominent throughout school life, normally.

Rivalry.—According to Kirkpatrick, appears in the 4th or 5th year. It may be relied upon to function throughout child-life.

Sympathy.—Seventh and 8th month, Tracy; 12th month, Sully; 22nd month, Baldwin; 27th month, Major; 3rd year, Kirkpatrick. Later responses are largely due to experience and training.

Pride.—Nineteenth month, Preyer.

Fear.—First appears, 2nd month, Tracy and Shinn; 3rd month, Major; 4th month, Dearborn and Preyer; 7th month, Sully; 1st year, Kirkpatrick. Fear is greatest in 3rd and 4th years, according to Kirkpatrick.

Anger.—In young babies, Kirkpatrick; 10th month, Darwin and Preyer; 2nd month, Perez.

Curiosity.—Twenty-second week, Preyer. Under proper conditions, curiosity functions throughout school life."

It will be seen from the above that all the important instinctive tendencies, except the socialistic, function normally throughout the school life of the child. The strength of these tendencies depends upon the demands made upon them in the experience of the child. The older and more fundamental to the life of man the tendency, the more independent it is of experience.

The teacher, then, has to make a careful study of his classes to see which of the instincts are functioning at their maximum, and upon that basis may arrange his course.

For centuries chief reliance was placed upon curiosity and imitation, as a cursory study of the history of teaching very well shows. From the time of Froebel more use has been made of play, and lately constructiveness and the social instincts have begun to be utilized. An interesting fact about this swing of emphasis from one to the other is that the use of play and constructiveness does not cause teachers to discard curiosity and imitation. For, as was pointed out in the first chapter, when a new method is utilized, and even sometimes pushed to excess, in the end it does not supplant the older valuable methods, but takes its place beside them if it demonstrates its value.

Because of their importance and their relative newness, a short explanation of the use and value of constructiveness and the social instinct will be well worth while.

Constructiveness.—Until recently children have in school been assumed to be intellectual beings merely, and little stress has been laid upon their interest in constructing things.

"Some few years ago I was looking about the school supply stores in the city, trying to find desks and chairs which seemed thoroughly suitable from all points of view—artistic, hygienic, and educational—to the needs of the children. We had a good deal of difficulty in finding what we needed, and finally one dealer, more intelligent than the rest, made this remark: 'I am afraid we have not what you want. You want something for the children to work at; these are all for listening.' That tells the story of the traditional education. Just as the biologist can take a bone or two and reconstruct the whole animal, so, if we put before the mind's eye the ordinary schoolroom, with its rows of ugly desks placed in geometrical order, crowded together so that there shall be as little moving room as possible, the desks almost all of the same size, with just space enough to hold books, pencils, and paper, and add a table, some chairs, the bare walls, and possibly a few pictures, we can reconstruct the only educational activity that can possibly go on in such a place. It is all made 'for listening'—for simply studying lessons out of a book is only another kind of listening; it marks the dependency of one mind upon another. The attitude of listening means, comparatively speaking, passivity, absorption; that there are certain ready-made results which are there, which have been prepared by the school superintendent, the board, the teacher, and of which the child is to take in as much as possible in the least possible time."[1]

But with the realization of the fact that pupils are predominantly interested in muscular activity in, at least, the early grades, several attempts have been made to so build the course of study that education shall come in part through building things. For, in order to build, it is necessary to learn arithmetic, to draw, to talk, and to think. Particularly is thinking better, because they think in terms of concrete cases which they understand, rather than memorize abstract matter that is foreign to them. The methods used for doing this work are outlined later in Chapter XIV, where descriptions are given and references cited for class reading.

While most of the work attempted in the use of constructive activities has taken it as a center in the lower grades, and while the typical American school has constructive work in the higher grades in isolation from all other subjects, there is a very good opportunity at hand for using it not as a center or in isolation, but as illustrative material in the higher grades and the high school. The chief objection raised is that it takes too much time to have the pupils draw, use sand tables, make illustrations from wood, paper, and clay. But it ought not to be hard for a teacher to obviate this difficulty.

A very good plan for doing this illustrative work in the sixth grade is to select one text, such as the history text for the grade. The teacher should run through the text and select those situations, events, and topics which are capable of easy illustration by drawing, wood, sand, clay,

[1] Dewey, *The School and Society*, pp. 43-4.

or paper. Before the time for taking up a topic arrives, the teacher should consider the simplest way of having the illustrative material made. When the time arrives the illustration should be made simply and expeditiously with the idea in mind that it need be no better than is necessary for illustration. This latter point is of importance, because when pupils, and teachers, too, get interested in a sand representation of Dutch life and geography, they are usually obsessed with the desire to putter around, putting in little non-essential details which waste time and add nothing to the illustrative value of the work. To illustrate well, only outlines, sketches, so to speak, are necessary.

Frequently different parts of the illustrative material can be assigned to different pupils. And if anything permanent is made it can be kept in the class "museum" for other children who come later.

The Social Instinct and Group Work.—Another still later tendency is to have the pupils co-operate in groups. This is in opposition to the individualistic attitude of the traditional school which requires pupils to work by themselves and to be held responsible for a lesson only to the teacher. The feeling at the basis of this attitude is that pupils will be likely to get too much assistance if they work together, and particularly the weak students will be injured. This feeling has, of course, some justification, and working in groups has to be safeguarded.

However, the advantages of group work are great, as is shown in the work of Scott, whose account is full of human-interest stories. It is evident from his account that pupils can get great value from working together. His earlier experiments were carried on by allowing pupils to organize into groups to do anything they wished, subject to certain restrictions set by the teacher. An account of this, which cannot be summarized without ruining its value, is found in the reference at the end of this chapter.

But he tried the experiment also later in regular class work in history, science, arithmetic, reading, language and literature, the manual arts, and the fine arts. The whole of his text from page 102 on should be read in detail by every student of methods of teaching. Here I shall describe briefly only the work done in *history* in the elementary school.

Miss Lotta Clark, who carried on the experiment, says:[1] "I talked the matter over with my classes and asked them how they would like to make the experiment of conducting their history lessons themselves. The novelty of the idea pleased them, and after considerable informal discussion we decided to carry on our recitations in the form of business meetings. A chairman was appointed from the class to take charge of the meeting, and there was something of a sensation when I exchanged chairs with him. He appointed committees to nominate candidates for a president, vice-president, and secretary. These officers were elected by ballot for one month, and their duties were decided upon by the class. We had an amusing time when they tried to decide what they ought to do with me. I told them I was going to do just as little as possible in the class, so that they could have all the time and opportunity there was. They finally decided to call me the 'executive officer,' with power to exercise full authority if necessity required.

"The pupils carried on the recitation with the teacher in the background to see that all went well. But the important outgrowth of this was that one boy took upon himself to read books and bring in interesting illustrative material;

[1] Scott, *Social Education*, pp. 150-156.

a girl asked to contribute drawings—copies of pictures in books not available for the whole class; another boy asked to use his camera to take photographs of Art Museum casts of characters in the history work." Says Miss Clark: "We did all these things and many, many more; and these suggestions led to the richest development of all in the work of this year. The classes formed themselves into little informal clubs, met at recess and after school, and decided what each would do to contribute something interesting to the lessons. There were the drawing clubs and the camera clubs, while the club that brought in pictures and newspaper clippings, and told interesting accounts which they had read, called themselves the Sidelights Club."

Enough has been said to show the practicability of this plan by which the pupils take over the work of the class and the teacher works in the background, always interested, always alert, and constantly holding high standard of effort. This plan does for all subjects what is later pointed out in Chapter XV for language. If the pupils feel that they can contribute something to the class they will work harder just as adults do. The greatest handicap to effort is the feeling that what I know, the teacher knows and most of the other pupils know, so what's the use of saying anything.

Strayer[1] gives two examples which are so interesting that they may be quoted:

"In a class in nature study in a fourth grade a boy told a wonderful story of the activities of a squirrel. Ordinarily the teacher might have been expected to tell the boy that the story was untrue and that she did not want that kind of stories. In this class, however, the children felt responsible for the contributions which were made. The story had no sooner been told than the narrator was plied with ques-

[1] *A Brief Course in the Teaching Process*, pp. 131-2.

tions. Where had he seen the squirrel? On what kind of a tree? What was the color of the squirrel? Just when did the events related happen? The boy could not answer these questions satisfactorily, and finally admitted that his story had a very slight basis in fact. The rebuke thus administered by his classmates probably did more toward giving this boy respect for truth than a dozen statements by the teacher that his contribution was unsatisfactory.

"In an eighth-grade class the children were discussing the panic of '73. One of the boys maintained that the causes of panics were, in general, the same, regardless of the activities of a few individuals occupying important positions in government or in the commercial world. His contention was mainly that it was unfair to charge a president or a political party with the distress occasioned by a panic, when in reality the cause was to be found in economic conditions over which neither president nor party had control. One of the girls in the class objected, and cited as proof the panic of '37, which she claimed was caused by President Jackson. The teacher could have settled the question immediately by an authoritative statement, which most classes of children would have accepted. In this class, however, the teacher encouraged the class to participate in the discussion. In the end the members of the class consulted text-books and other more complete histories, and reached their own decision with comparatively little help from the teacher. The value of this work in history consisted mainly in the fact that the children, having once discovered the problem, felt responsible for its solution. They were engaged in the liveliest kind of thinking and discussion. They were learning where to go, and what materials to use in the solution of this kind of problem."

The method is capable of infinite variation suited to the needs of an alert teacher. Children love to accept responsibility and to contribute things that are *worth while* to the class, or to the teacher, if they really feel that it is a contribution to the store of knowledge of the group. Such work relieves the monotony of the pouring in and giving back of the individual work of the traditional schoolroom. There is, of course, a very definite place for individual responsibility, and this needs to be felt by the pupil toward the teacher, but whenever it can be lightened and varied by the feeling of responsibility for contributing to the class and keeping up to standards set by the class, good work and increased interest is the beneficent result.

Summary.—Children differ among themselves. The majority of the pupils in a well-graded class are practically equal in ability but some are always brighter and some slower. They differ in temperament, some being students, others strongly emotional, and still others practical. They are different, too, in their types of imagery, some being predominantly visualizers, others motiles, and still others audiles. Then, again, girls differ from boys in ways of working.

Children also differ from year to year as the instincts mature and the environment changes. Up to date, these changes have not yet been charted with sufficient accuracy to give the teacher definite information as to the maximum periods of each. It is, however, fairly well demonstrated that during school life all of the instincts are functioning and that appeal can be made to any of them subject to individual differences in pupils and to the unknown point of their maximum intensity. In particular, in present day school work, appeal is made to five: curiosity, imitation, play, constructiveness and co-operation. As a result each teacher needs to work out for himself his own scheme for each individual class, or a more general one for all classes of a certain age.

Section 3. The Culture Epoch Theory

The Recapitulation and Culture Epoch Theories.—A very interesting attempt to mark off the periods of childhood have been made in the *recapitulation* and the *culture epoch* theories. Both these theories claim that, from conception to maturity, man, before birth and after, passes through all the stages that the race has passed through in its evolution from the dawn of life on this planet. It is pointed out that the human ovum begins as a one-cell organism and then passes through foetal stages in which it cannot be readily distinguished from the foetus of fish, reptiles, birds, and mammals.

It is carried further in asserting that after birth the child passes through the stages of civilization of the race. If the periods of racial development are (after Chamberlain) the rooting and grubbing stages, the hunting stage, the pastoral stage, the agricultural, and the commercial stage, then the theory claims that, in its general outlines, childhood passes through each of these stages. In the first stage the child uses the mouth as a criterion for everything; in the second stage we find children fearing strangers, stalking imaginary game; in the third is evidenced a fondness for pets and the desire to own things; in the fourth foresight begins to develop and a passion for gardening arises; and in the fifth come bulging pockets, demand for pay for service, recognition of value and sense of arithmetic.

The first of these stages extends to five years, reaching its culmination in the third year; the second extends from four to twelve years, with its highest development in the seventh year; the third period extends from nine to fourteen, with its greatest intensity in the tenth year; the fourth period from twelve to sixteen, with its maximum in the twelfth year; and the fifth from fourteen to forty, with its greatest intensity in the eighteenth to twentieth years.[1]

The culture epoch advocates seek, in addition to naming the stages of childhood by a recapitulation theory, to determine what subject-matter should be in each period. Many classifications of stages are given by different writers. Of these Rein's scheme is interesting as showing the racial stages, the school years that correspond to them and the subject-matter to be studied (in the German Folk School).[2]

<table>
<tr><th>School Year</th><th colspan="2">Materials of Instruction</th><th>General Character of Epochs</th></tr>
<tr><td>1</td><td colspan="2">Folklore and Fairy Tales</td><td rowspan="4">Mythical and Heroic Mind</td></tr>
<tr><td>2</td><td colspan="2">Robinson Crusoe</td></tr>
<tr><td>3</td><td>Sacred
Patriarchs and Moses</td><td>Profane
Thuringian Tales</td></tr>
<tr><td>4</td><td>Judges and Kings</td><td>Nibelungen Tales</td></tr>
<tr><td>5</td><td>Life of Christ</td><td>Christianizing and Kaiser Period</td><td>Mediæval State building</td></tr>
<tr><td>6</td><td>Life of Christ</td><td>Kaiser Period</td><td>Historic Mind</td></tr>
<tr><td>7</td><td>Paul</td><td>Reformation</td><td rowspan="2">Social and Political Development. Scientific and Philosophic Mind</td></tr>
<tr><td>8</td><td>Luther</td><td>Nationalization</td></tr>
</table>

Criticism of Culture Epoch Theory.—The chief trouble with the culture epoch theory is that while it is a pretty theory it will not work. It is impossible to take a class of children and find these stages standing out in any definite way. In a very general way there *may* be some parallelism between the development of the race and of the child, but it is not sufficiently definite for the educator to use in building a course of study upon.

For a fuller statement of the *recapitulation* and the *culture epoch* theories and for a complete criticism, references at the end of this chapter have been given.

[1] Chamberlain, *The Child*, pp. 51-105.

[2] Van Liew, *Year Book of Herbart Society*, Vol. 1, p. 99.

SECTION 4. THE TEACHER'S TOOLS

In translating his ways of acting into terms of his pupils' experience, the teacher has several tools that he can use.

Necessity of Sympathy.—That there is need for both emotional and intellectual sympathy with the pupil is incontrovertible. We have seen that knowledge grows by the reorganizing of experiences. Teaching is not a pouring-in process. Facts cannot be hypodermically injected. The teacher may think that he has performed such an operation, but he may rest assured that no matter what the fact means to him, its meaning to the pupil is determined by the facts which he already possesses, and by the relations which the new fact sets up with what he already knows. Even when the teacher thinks that he has translated his subject-matter into terms of the child's experience, he may find that a different meaning from that intended has been given. This calls to mind the case of the teacher who laboriously endeavored to make clear the nature of a volcano by building up a cone of sand upon the sand table, and having made it realistic by lighting some decapitated firecrackers in an aperture at the top, rested content with his illustration. His feeling of complete defeat may be imagined when the next day one of his little boys said, "Please, teacher, may we have some more of the fireworks today?"

The concept of apperception emphasizes this same fact. Whatever may be its shortcomings, it has succeeded admirably in showing us that new ideas are interpreted in terms of old, that nothing absolutely new can be added to experience like potatoes to a bin, but that each idea apprehended must be apprehended in terms of what is already present, even though on that account wrongly apprehended. For a good little monograph on this subject, read Rooper's *Pot of Green Feathers*.

This necessity is further emphasized when we reflect that the inexperienced teacher is farther removed from the child's standpoint than is the average individual. The teacher is highly intellectualized; he is a student of books; he has the habit of analyzing his ways of thinking and acting, and of performing this analysis in a highly abstract way. His vocabulary is generally literary and scientific; his world is scholarly. The average individual, on the other hand, is concrete in his thinking, he has an unscientific vocabulary, he thinks in empirical terms. The teacher, therefore, must make greater deliberate effort to get on the level of his pupils than would the average individual. He must at times deliberately step out of his own world and enter that of the child if the latter is to be led back with him into his larger world.

What we have been saying applies to the teaching process in general. The preacher who teaches religious truths, the political campaigner who convinces his audiences, the father who explains facts and principles to his child, the merchant who shows the new clerk what to do, the musician who touches the hearts of the people, all must translate the thing they wish to teach over into the experience of those whom they are trying to teach.

Introspection.—In spite of the wide gap between the experience of the adult teacher and that of the child, the most fruitful source to which the teacher can turn is his own experience. When the teacher is trying to foresee the difficulties that the child will meet in grasping the problem upon which he is bent, and to forearm himself with methods for removing those difficulties, he is forced in the last analysis to consider what he himself finds to be the difficulties. If he is to teach problems in arithmetic he studies them with a view to finding out what are the crucial points—

the points that are likely to give difficulty to the pupils; and in doing this he has no other recourse than to his own experience, unless it be to the recollection of the difficulties that former pupils have had. And again, in determining the best way of explaining the difficulties to the children from among various methods which may suggest themselves, he makes choice according to standards of clearness and simplicity as set up by his own mind.

This, of course, implies that in his introspection he imagines himself, as well as he can, to be in the pupil's place, with the pupil's standpoint and degree of development. In other words, in this introspection he examines his child self rather than his adult self.

The same principle applies in discipline. When the teacher has a problem in discipline, and is seeking for the best way of handling it, he again appeals to his own experience, and particularly to his child self. He considers the question,—Does this plan that I am about to follow appeal to me as fair? Would it have helped me into the proper attitude toward some one in authority over me when I was a child? Would it have produced the proper results upon me if tried by some one else? In other words, the value of sympathy to the teacher is essentially that of being able to make his experience congruous with the pupil's in order that by introspection he may decide what, to his congruous experience, seems the most satisfactory thing to do. This ability to vividly recall childhood in all its phases and sentiments and little judgments is admirably presented in the early part of *David Copperfield*.

Psychology.—Another aid which has been overrated by some and underrated by others is psychology. This subject aids the teacher because it gives a scientific account of the ways in which experience operates in securing efficiency. It is important because it is scientific. It aids untrained introspection by helping it to see the great and fundamental processes that operate in experience. A teacher is unwise if he pays no attention to it, because it is clearly evident from the long history of psychology that no one man, even of commanding intellect, is able unaided to discover all these processes. A great army of men have spent their lives investigating these things and giving a scientific account of them. And no teacher with the multitudinous duties of the schoolroom to hamper him, is able to get without help as clear a conception of the working of the mind as he can get by utilizing the fruit of their labors. If he does not use it, it is as though he kept his capital idle instead of investing it. Moreover, psychology will give him certainty that he is not setting up artificial aims, and that he is not using ineffectual and perverting methods.

Psychology has three fields which are of value to the teacher: *First,* general psychology, which treats of the mental processes of the normal adult; *second,* educational psychology, which applies the principles of other branches of psychology to educational problems; and *third,* genetic psychology, which treats of the growth of the content and processes of experience. The chief merit of genetic psychology is that it emphasizes the fact that at different ages the child has a different content of experience, is dominated by different interests, and possesses varying fineness and persistence of activity.

Theory of Method.—Another aid in solving the problems of teaching is found in a study of the methods of teaching. Essentially, a study of teaching is reflection upon the way that subject-matter grows and organizes itself. It differs from psychology in that, while psychology treats of the child in terms of the processes of experience, such as memory, imagination, etc., methods of teaching deal with the ways in which the child gets control of subject-matter. For pedagogical purposes they both deal with the same great problems and are closely interrelated, being two aspects of the same thing, but differing in the point of view from which each is studied. The great problems of the theory of method are essentially those of the organization of racial subject-matter, of getting the child to start to work upon subject-matter, getting him to organize his subject-matter, and of applying these organizations to the handling of other units of subject-matter. And, as we have said, in working upon these problems the teacher reflects upon his own methods of organization, upon the way in which racial subject-matter is organized, and, finally, studies, by means of practical experience, the ways in which subject-matter is organized in the experience of everybody, especially children. As a result of this reflection he arrives at the principles of pedagogy and methods of teaching.

Practical Experience.—All the aids that we have mentioned may be well in hand before any practical teaching has been engaged in. They are part of the equipment with which professional schools should provide the teacher. But let the inexperienced teacher try as he will, he is sometimes unable to build up within himself an experience in harmony with that of his pupils. The difficulties which he imagines, may be only a few of the many difficulties which the child may have. The method of explanation which seems perfectly obvious to him may be turgid to his pupils. The methods of discipline which seem fair to him may to the child seem unfair; even his child self may be too mature to approximate very closely to the pupil's experience. Moreover, his study of psychology may have given him a knowledge of the principles of psychology without giving him a knowledge of their peculiarities of combination in individual children, and his principles of pedagogy and methods of teaching may be merely principles and methods which, so far as he is concerned, have yet to be tried on in actual practice. He has not as yet met the child on his native heath; he has verified the principles which he has accepted merely by an appeal to his own experience, or by an appeal to the records of child experience contained in books. He has, therefore, many problems to work out before he can translate his experience, his knowledge of the world, and his attitude toward life, over into the experience of the children who now, for the first time, are actually before him. At this point practical experience enters as the last aid in helping him solve this problem.

Practical experience is of so much importance that some have claimed that it is the most important factor in the making of a teacher. But in considering this statement we have to distinguish clearly between empirical and scientific experience. By empirical experience we mean that acquaintance with teaching which is picked up by the teacher in a naïve way. By scientific experience we mean that experience which is secured in actual teaching when the teacher is armed with the principles and the theories of teaching which enable him to interpret what is taking place, and to react to it according to the fundamental ways of acting which his principles provide for him. We cannot, therefore, make the broad assertion that practical experience is the most important aid to the teacher. Empirical experience may be a positive detriment to him, as any teacher in a normal school or teachers' college can testify. But such is not the case with scientific experience. Its assistance is powerful; it throws light upon the teacher's psychological principles, and gives content and meaning to his theories of teaching.

References for Class Reading

Strayer. *Brief Course in the Teaching Process.* pp. 15-27.

On Stages of Child Life:

Chamberlain. *The Child.* pp. 54-64.

Dopp. *The Place of Industries in Education.* pp. 104-171.

Kirkpatrick. *The Individual in the Making.* pp. 55-60.

On the Culture Epoch Theory:

Bolton. *Principles of Education.* pp. 108-118; also pp. 63-107.

Van Liew. *Herbartian Year Book.* Vol. 1, pp. 78-103.

Dewey. *Herbartian Year Book.* Vol. 2, pp. 89-95.

Baldwin. *Mental Development in the Child and in the Race,* pp. 17-35.

Montgomery. *The Analysis of Racial Descent in Animals.* pp. 189-194.

On Individual Differences:

Thorndike. *Principles of Teaching.* pp. 68-98.

On the Constructive Instinct:

Dewey. *The School and Society.* pp. 43-65.

On the Social Instincts:

Scott. *Social Education.* pp. 102-115, 150-156.

Strayer. *A Brief Course in the Teaching Process.* pp. 129-138.

Exercises

1. Give five examples outside of school in which experts were poor teachers.

2. Classify twenty of your friends on the basis of temperament—intellectual, emotional, and practical. Do any of the cases overlap?

3. Study your own imagery to see whether you are an audile, a visualizer, or a motile.

4. The women of the University of Missouri have been found, for the last three years, to lead the men in ranking in scholarship. How do you account for this difference?

5. Study a boy or girl of your acquaintance and determine to which instincts you could best appeal. Check up your investigation by determining whether it would be practicable and wise to do so. Avoid a superficial observation of some one instinct.

6. If you discard desks "made for listening," what sort of practicable furniture would you substitute?

7. What form does constructiveness take in the high school?

8. Can the social instinct be used in high school classes with advantage? Illustrate your answer pro or con.

9. Give instances within your own experience of good group work in the grade, of group work that was a failure, and state the essential differences between the cases that caused success or failure.

10. Criticize the culture epoch course of study given in the table and that referred to in Bolton.

11. Give five instances of failure in handling pupils because of failure to understand them.

12. What advantage in handling boys has the teacher who, as a girl, was a tom-boy?

CHAPTER IX

MOTIVE

Section I. Interest

Definition of Motive.—The problems of teaching are discussed in cycles. Twenty years ago drill was the favorite topic of discussion, ten years ago we were studying the developing method and interest, today the current theme is motivation.

Motivation, however, is a full brother to interest. But it is not identical with this subject because it involves new elements in the situation, the need and the problem. Where formerly we asked, How does interest work in education? we now ask in addition, What effect has a feeling of need upon learning? and, What is the use of the problem in teaching? Interest, need and problem are all forms of motive.

The term "motive" is best defined by its generic meaning. It is derived from the Latin verb *moveo, motum,* and means that which moves one. A motive, then, is something which moves one to action. It is, as Dewey incidentally remarks, a motor. It is something that drives, impels, forces, and incites the individual to perform action.

The problem of this and succeeding chapters is, in brief, that of describing these various forms of motive (interest, need, and problem) in such a way as to show how they arise and operate.

Interest and Values.—The pupil is constantly attempting to control values. If he builds a kite to fly, if he works arithmetic in order to finish it, if he reads a story to see what happens to the hero, he is trying to control values.

In controlling these values the pupil utilizes his own activity. In fact, he may be said to be a bundle of activities. Formerly we thought of him as a granary in which were stored up grains of facts, or as a pitcher made to hold water or dust and cobwebs. But the modern conception considers the pupil, not as a receptacle, but as a living, moving, active organism. He is always doing something, either with his hands or his mind. Thinking, feeling, willing are all forms of his activity. He has moral, social, physical, æsthetic activity, and the result is always development. The pupil is never inactive because for him there is no such thing as inaction. That which is called inaction is action not along the line some one else wants. The inactive pupil in the schoolroom is actively engaged in *some* line of thought; we call him inactive because he is not interestedly engaged in the lesson of the moment.

This activity which is the all-in-all of the pupil has certain predilections to and predispositions toward the direction it takes. Generally it likes to play a game; frequently it hates to hold a hoe handle and chop weeds. Sometimes in one pupil it likes to work arithmetic; in another this may be disliked. In other words, the pupil has biases. Some of these are born with him, are instinctive and innate. He is instinctively interested in games, in making things, and in being with other people, but the vast majority of his predilections are acquired. We call these predilections or predispositions interests.

Characteristics of Interest.—Interest has in the *first* place feeling. It has the feeling that accompanies absorption. It is a feeling of worth. As Dewey says, "The root idea of the term [interest] seems to be that of being engaged, engrossed, or entirely taken up with some activity because of its recognized worth."[1]

This feeling is probably always pleasurable. Deep engrossment in any activity, as, for example, in building a box, in playing a game of whist, or in reading a fascinating story, is always pleasurably toned.[2] Titchener lays stress upon the fact that interest is a feeling when he defines it as the feeling side of attention.

In the *second* place, interest is dynamic. This is at once clear since an interest is the feeling toward a particular form of activity—that toward which we are predisposed. If a pupil is interested he tries to accomplish the valued plan, he attempts to possess the desired object, and endeavors to make the coveted article. Interest is a motor, collecting his activity and converting it into power which turns the wheels of his mind and materializes the patterns designed. If the motor fails to work, all the power stored in the reservoirs of his experience are absolutely incapable of turning a wheel.

In the *third* place, interest always has an object. That is,

[1] Dewey, *Interest in Relation to Will,* p. 13.

[2] Even in such a case as interest in an aching tooth the same is true. There are thrusts of pain, and efforts to use a cure all, haste to reach the dentist, observation of his deliberate selection of forceps, the pressure of the steel under the gums, the laceration, the fiendish probings and the final crunch and twist. In such a case it would seem that interest could not be pleasurably toned. Yet in this extensive series of actions which take a long time and which, looked upon as a whole, is anything but pleasant, what we really have is a series of situations in which we actually feel interest and interspersed among a series in which we feel pain rather than interest. We feel the throb of pain, we get interested in locating it and forget the pain for a second. In this locating there is satisfaction, again comes the throb, and a rush for the liniment, in which some satisfaction follows the pain. The point is that interest is staccato in this case and that we must not confuse the unpleasant total with the intermittent neutral overtones of interest, which are forgotten when we think about the whole experience.

we are interested always in something. The activity of the pupil is going *some* where, is directed at *some* object. Often it is misdirected. Sometimes a group of children will bob up and down in their seats, wildly waving the right hand, snapping fingers, then alternating to the left hand still wildly snapping while the teacher is leading in the excitement. The observer as he watches the lesson progress may feel that there is great interest. Another more cynical observer may say that it is interest directed at nothing because the class is getting nowhere. As a matter of fact, the second observer may be right in saying that the class is getting nowhere, for the interest of the class has run amuck. But in running amuck they run somewhere. They are interested in each question of the teacher, in snapping their fingers, in keeping a "correct" position in spite of snapping digits. The only trouble is that these objects of interest are not organized. They are in confusion because they have no leader to help them get interested in things which are connected in such a way that, when the lesson is over, a definite step forward will have been made.

Degrees of Interest.—Interest, like values, (p. 18) differs in intensity. It may be very mild. In eating three meals a day some people have enough interest to eat them, but little beyond. Most matters of routine evoke only this mild sort of interest, and probably ninety per cent of an average adult's time is spent in doing things of minimal interest. Children, however, put more intensity into a larger percentage of their time and some people put more interest into everything they do than do others. It is a case of the intense *versus* the neutral temperament.

On the other hand, interest may be very intense. The absent-minded person is one who is so intensely interested in what he does that he is unable to pay attention to anything else. "The artist is the man above all others to whom routine is utterly delightful, not because it is easy, not because it fosters the caprices of his indolence, but because it calls into action the very best of the man himself." Children display a like abandon in things which interest. Many a boy will spend hours working earnestly upon a tricky problem in algebra, or upon the construction of a sled, in teaching his dog a trick, or in reading a tale of blood and fury.

Between these two extremes lie all degrees of interest. But, as Bolton, remarks,[1] "the greater the amount of interest the better. No one ever accomplished much in any direction until he gave himself to his task body and soul. The scriptural injunctions 'Whatsoever thy hand findeth to do, do it with thy might' and 'Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind, and with all thy strength,' etc., contain the key to the secret of success. It is not advocated here that work should be made disagreeable. Even though a given occupation may seem dreary, exhausting, irksome, the whole of which this unit is a part, should be of absorbing interest. The end to be attained should be so alluring that no amount of disagreeableness could drive us away."

Kinds of Interest.—There are several classifications of interest. James gives two kinds—native and acquired. He says:[2] "Now, some situations appeal to special instincts from the very outset, and others fail to do so until the proper connections have been organized in the course of the person's training. We say of the former set of objects or situations that they are *interesting* in themselves and orig-

[1] Bolton, *Principles of Education*, p. 673.

[2] James, *Talks to Teachers*, p. 91.

inally. Of the latter we say that they are natively uninteresting, and that interest in them has first to be acquired."

McMurry gives two—direct and indirect. He says:[1] "It is customary also to speak of direct and indirect interest; by the former being meant the real thing, by the latter a reflection or borrowed light. Direct interest is felt in the thing itself for its own sake and indirect interest points to something else as the real source. A miser loves gold coins for their own sake, but most people love them only because of the things for which they may be exchanged."

Dewey and others classify interest as immediate and mediate. Dewey says:[2] "There are cases where self-expression is direct and immediate. It puts itself forth with no thought of anything beyond. The present activity is the only ultimate in consciousness. It satisfies in and of itself. The end *is* the present activity, and so there is no gap in space nor time between means and end. All play is of this immediate character. All purely æsthetic appreciation approximates this type. The existing experience holds us for its own sake, and we do not demand of it that it take us into something beyond itself. With the child and his ball, the amateur and the hearing of a symphony, the immediate engrosses. Its value is there, and is there in what is directly present. * * *

"On the other hand, we have cases of indirect, transferred, or, technically, mediated interest. That is, things indifferent, or even repulsive in themselves, often become of interest because of their assuming relationships and connections of which we are previously unaware. Many a student, of so-called practical make-up, has found mathematical theory,

[1] McMurry, *Elements of General Method,* pp. 88-9.

[2] Dewey, *Interest as Related to Will,* pp. 15-16.

once repellent, lit up by great attractiveness when he studied some form of engineering in which this theory was a necessary tool. The musical score and the technique of fingering, in which the child can find no interest when it is presented as an end in itself, when it is isolated, becomes fascinating when the child realizes its place and bearings in helping him give better and fuller utterance to his love of song."

Dewey's and McMurry's classification involve the same facts with different names. Immediate interest would include all of James' native and some of the acquired. In the text we shall use the terms immediate and mediate meaning by immediate interest that interest found in activity that is of value in itself, and by mediate interest that which accompanies activity carried on solely because it will give control of some other value.

What Is of Immediate Interest?—If a teacher could tell in advance what is of immediate interest to children he would have his problems of motive three-fourths solved. But, as Angell says, "in the main we cannot say in advance of the actual test with each individual whether an object will call out an emotion or not. The peculiarities of personal constitution, the vicissitudes of personal history, the reigning mood—these and a thousand other factors may all enter in to modify the reaction."[1]

There are, however, a number of classes of objects which are likely to be of immediate interest. They may not prove interesting but the chances are in their favor.

(1) Objects and situations that call for the instinctive actions are usually immediately interesting. Playing, making objects, such as mud-pies and sand-heaps, running machinery, and eating, evoke the spontaneous in-

[1] Angell, *Psychology*, pp. 421-2.

terest of children of one age or another. Elaboration is not necessary.

(2) Moving objects usually attract the attention spontaneously. Throughout the history of the race these moving objects—the leap of an animal, the movement of an enemy—have had such a close bearing upon life that the tendency to watch and become absorbed in them is strong.

(3) The concrete and objective is more likely to be of immediate interest to children because probably so much can be done with them. At any rate those concrete objects which are used take on a value and interest of their own.

(4) Among concrete objects, those that appeal to the senses evoke spontaneous interest from children, bright pictures, loud noises, jingles, smooth objects, action songs, usually appeal at once. "Novel things to look at or rare sounds to hear, especially when they involve the spectacle of an action of a violent sort, will always attract the attention from abstract conceptions of objects verbally taken in. The grimace that Johnny is making, the spit-ball that Tommy is ready to throw, the dog-fight in the street, or the distant fire-bells ringing—these are the rivals with which the teacher's powers of being interesting have incessantly to cope."

(5) The new, if it is in line with the immediate interests of the children, is likely to evoke that interest. A new problem in arithmetic, a new doll, a new dress, a new reading lesson—will all be of immediate interest if the children are interested in those sorts of things. If they are not, the new object will call forth no spontaneous interest.

(6) Familiar situations evoke immediate interest, sometimes, when absences have occurred. But in the main,

familiarity is less likely to elicit interest than is novelty. Children sometimes love old stories best but not often and then only because the sensations accompanying the recital are forgotten and the story comes as a new one and because they would rather have a good old story than run the chances of a poor new one.

However, as stated above, while these different classes of things run a good chance of evoking immediate interest, there is no guarantee that they will do so.

Section 2. Conditions Giving Rise to Mediate Interest

In school as in life, there are a vast number of objects and situations which in themselves are of no interest but which under other conditions secure a borrowed interest in themselves. This transfer is of prime importance and it is our purpose to examine into the nature of these conditions.

No definite statement of methods is given. James says:[1] "*Any object not interesting in itself may become interesting through becoming associated with an object in which an interest already exists.* * * * An idea will infect another with its own emotional interest when they have become both associated together into any sort of a mental total. * * * *Associate the new* [objects] *with the old* [objects of interest] *in some natural and telling way, so that the interest, being shed along from point to point, finally suffuses the entire system of objects of thought.* This is the abstract statement; and, abstractly, nothing can be easier to understand. It is in the fulfilment of the rule that the difficulty lies; for the difference between an interesting and a tedious teacher consists in little more than the inventiveness by which the one is able to mediate these associations

[1] Op. cit., pp. 94, 96.

and connections, and in the dulness in discovering such transitions which the other shows."

The method here may be summed up in a sentence: Associate new objects with old objects of interest in a natural and telling way. But the question the teacher needs to know is how to associate in a natural and telling way.

McMurry has a statement similar to James, when he says:[1] "There are many facts in each branch of study which, in themselves, excite little or no interest, just as there are many details in a man's business which, in themselves, are only tedious. All of these facts may acquire a secondary interest by close association with interesting things with which they are brought into relation."

However, this latter author lays his chief emphasis upon direct or immediate interest and so has little concern in working out the methods of securing mediate interest. This seems to be the case from a foregoing quotation which gives a fair view of his attitude as stated in *The Elements of General Method*. "It is customary also to speak of direct and indirect interest; by the former being meant the real thing, by the latter, a reflection or borrowed light (p. 88)." He says that these indirect interests need to be carefully scrutinized by the teacher because "they often serve as a blind to conceal most hateful qualities in the development of character." He adds they are "vital to success only when they follow in the path of strong and genuine interests." Finally, "the kind of interest which we think is so valuable for instruction is direct and intrinsic. It reaches down into those spontaneous and instinctive forces in child life out of which all strong activity must spring." (p. 92.)

It seems to the writer that the storm of criticism that

[1] *Elements of General Method*, p. 91.

has assailed the doctrine of interest set forth by the Herbartians is chiefly caused by the tendency to underemphasize the place of mediate interest.

Dewey says: "In reality the principle of 'making things interesting' means that subjects shall be selected in relation to the child's present experience, powers and needs; and that (in case he does not perceive or appreciate the relevancy) the teacher shall present the new material in such a way as to enable the child to appreciate its bearings, its relationships, its necessity for him."

Ruediger uses another term[1] which is not analyzed. He says, following James: "The pedagogical principle involved may be stated as follows: Begin with a native interest, or an interest already acquired, and graft upon it the new thing you wish to teach. If this is skillfully done, the original interest will radiate to the new thing taught, but it requires native skill, tact, as well as psychological knowledge, to apply the principle." Here the method is to graft the one on the other, but the method is left to the native skill and psychological knowledge of the teacher.

References for Class Reading

Bolton. *Principles of Education.* pp. 672-674.
Dewey. *Interest as Related to Will.* pp. 12-18.
James. *Talks to Teachers.* pp. 91-99.
McMurry. *Elements of General Method.* pp. 84-93.
Thorndike. *Principles of Teaching.* pp. 51-59.

Problems

1. Name a half-dozen phrases used in education which imply that the pupil is a receptacle.

2. Give five cases in which superficial inaction was really intense activity along other lines.

[1] Ruediger, *The Principles of Education,* pp. 20-4-5.

3. Give five examples of where children do difficult things because of interest in them.

4. Does it do any good to have pupils perform tasks that have little interest for them? In answering this question name five such tasks as examples about which to discuss the questions.

5. What is the value to teaching of the fact that interest may be attached to objects?

6. Give five cases of great superficial interest in a schoolroom where there was little interest in the problem of the lesson.

7. Give two personal instances of the greatest interest you have ever felt in any situation.

8. Give five examples of minimal interest.

9. Is it your observation that adults have more or less intensity of interest than children? In everything? In particular things? Which is the longer sustained?

10. Name ten things that are of immediate interest to you.

11. Name ten that would have no interest were it not that they are of use to you. To what use do you put each?

12. Give five cases in which moving objects are not of interest. Is it true in your case that they usually are?

CHAPTER X

MOTIVE—(Continued)

Section I. Need

Specific Examples.—When we come to consider the method by which the connection is made between the immediate interests and objects without immediate interest, and investigate the method of securing this derived interest, the point of view elaborated earlier in the text will assist. And a few illustrations from practical life will serve to introduce the method.

A life insurance agent tried for two years to interest a "prospect" in a policy and uniformly failed. Then the man married. He sought out the agent and bought a policy.

I once had a private pupil sixteen years old whom I tried to get interested in blacking his shoes and combing his hair, but without success. One day, a month after I ceased my ministrations upon his personal appearance, I saw him on the street with not only his hair combed and shoes shined, but with his trousers pressed. I tactfully inquired about the transformation and found that he had in the meantime met the lady of his choice who had spoken to him about the matter.

The wealthiest correspondence school in the country enrolls men who, while in the public schools, had no interest in the subjects for instruction in which they now pay large fees.

Tommy, playing with the boys, is called home by his father, but shows no interest. The father says, "Tommy, if you don't come home, you will get no supper." He becomes interested at once.

Analysis of Need.—In these cases, mediate interest comes because *first* the individuals recognized some value—the young husband wished to protect his wife, the youth to please his sweetheart, the students to succeed in their chosen work, and Tommy to eat a square meal. These were, in each case, things of immediate interest. *Second,* they recognized that they did not have control of these values. The husband had no protection for his wife, the youth's sweetheart had spoken disparagingly of his personal appearance, the students felt their lack of knowledge and training, and Tommy believed his father when he threatened. *Third,* they realized that the way to control values was to do this thing in which they had not previously been interested. The husband bought the policy, the youth brushed up, the students took the courses, and Tommy hurried home.

This reason for becoming interested is called *need*. It is essentially a *recognition of inability to control something of value*. In the remainder of the section the concept will be analyzed. But before doing so, the different methods of securing mediate interest will be summarized.

1. Associate the hitherto uninteresting object with an object of immediate interest.
2. Make this association in a natural and telling way (James), with native skill and psychological information (Ruediger), by showing its relevancy to the child's experience, powers, and needs.
3. Create a need for the new object by making the child appreciate his inability to control some value of immediate interest. Make him aware of his short-

comings, place him in such a position that he realizes his difficulties, his errors, and his troubles.

Other Illustrations.—Need has a much wider application than that of being a means of securing mediate interest. It is a fundamental concept in the handling of all processes of human life from a functional point of view.

For instance, we remain unconscious of objects until habit *breaks down*. As Angell says:[1] "An expert can use a typewriting machine almost without any conscious guidance of the movements which are necessary to operate it. He has acquired by long practice a set of habits whereby he manipulates the keys. These habits involve, among other things, co-ordinating the movements of the hand with movements of the eyes, the latter movements being in part reflex; *e. g.*, accommodation of the lens. As the writer proceeds, his mind may be entirely absorbed in the *meaning* of the sentences which he is composing. But if the machinery of the typewriter becomes clogged, the operator must at once direct his attention to the machine, abandoning all thought of the composition. His automatised writing habits are powerless to deal with such a difficulty and they must consequently give way to *conscious* control processes."

Take another illustration given in psychology. Miller says:[2] "Judgment is called forth under conditions of doubt or uncertainty of some sort which interferes with reaction, mental or motor. It is then necessary for us to raise the question, 'What is this?' We have to evaluate the situation, etc."

All forms of religion are due to the fact that the originators of each form were dissatisfied with the existing methods of controlling religious values. Jesus, Luther,

[1] Op. cit., p. 63.

[2] Miller, *The Psychology of Thinking*, p. 277.

Knox, Wesley, Swedenborg, come easily to mind. Each was dissatisfied and built up a new religion or the modification of an old religion.

All forms of government had their origin in dissatisfaction with older forms. They are organized protests, which have taken on mutual form. Limited monarchy, republicanism, democracy, began in discontent. Even an absolute monarchy had its rise in the dissatisfaction with earlier unorganized and futile attempts at protection.

Arithmetical forms each rose because earlier methods of computing were unsatisfactory. Multiplication is used instead of addition because addition is too slow, division because subtraction is slow, decimals because common fractions are too cumbersome.

Every new machine is conceived in disability and born in dissatisfaction. The inventor finds something that does not work right. The telegraph is born of slow communication by post, wireless telegraphy by the cumbersomeness, expense, and inability of the older form. Gas is used for cooking because coal is heavy and dirty, and electricity for lighting because gas has an odor and is expensive.

In fact it may be laid down as a general principle, that every new activity participated in by man is born of some need, of some inability to do what he wants to do. It is the universal spur to action.

Hence it is clear that, if a pupil is to secure mediate interest in objects, an excellent method lies at hand in the need. Get him to recognize that he cannot control a value and as naturally as the plant turns to the sun, and the magnetic needle to the pole, his interest will turn to the means of control. It is a law of human nature.

Characteristics of Need.—Need, like interest, has three characteristics: *First,* it is a feeling. But unlike interest it is usually disagreeably toned because its object is a breakdown in something we want to do, a doubt about a cherished object, a failure to accomplish, a mistake in plans of action. These are unpleasant things to contemplate.

Second, it is dynamic. It, like interest, is a motor, all the stronger because activity is held up, impeded, by an obstacle, and it is a law of life that nothing shall forever stand in the way of man's desires. When the obstacle is met, he works the harder.

Third, it has an object. It has some idea within it—and the object on which attention centers is this obstacle, mistake, dissatisfaction, breakdown, or disability.

Is Need Always Present?—The question arises, Do we feel a need for everything we do? Do we feel that what we are now doing is not satisfactory before we do something else?

A woman sees a hat in a window and buys it. Did she feel that her old hat was not satisfactory? A philanthropist gives a beggar a dime. Did he argue that if he walked on he would feel ashamed of himself? A traveler tips a waiter. Did he think that if he did not give it he might appear small? A mother snatches her child from under an automobile. Did she think how grieved she would feel if she stood still and allowed the child to be injured? A pupil builds a wagon. Did he build it because he realized the unpleasantness of playing without one? He may or may not have done so, the need is present, but it may be either implied or felt. The woman who bought the hat may have thought that her old hats were out of date, or at least failed to impress Mrs. Grundy. The philanthropist may have felt ashamed of going on. Tips are usually given because a man does not wish to appear cheap. The mother may have had rushing visions of a mangled child, and the boy may have wanted a wagon for months. They may all have felt the need.

Or, on the other hand, the sight of the hat may have been so compelling that the woman skipped the intervening need. She may not have thought of her present sad condition. The sight of the beggar may have made the philanthropist put his hand in his pocket and give the dime. The boy may have seen a wagon and said, "I am going to have one like that." But if they had stopped to think before acting, each *could* have found a need, a disability and dissatisfaction.

Needs are then present potentially and implicitly or they may be felt. But if you find a man reluctant to do what you want, make him see that something he wants cannot be done till he does what you want, and if he wants his badly enough he will do yours.

Value of the Conception of Need in Education.—*First,* it lays stress upon the consciousness of mistakes, of failure as a motive for action.

At once objections arise. Some pupils are already too much inclined to notice their own mistakes. To be sure, a few are—the average individual is not, neither boy nor girl. He is, on the whole, too easily satisfied. The sensitive self-distrusting pupil needs to have little attention paid to him by the teacher to make him conscious of his failures. But his is an unusual case—less than ten per cent of the cases.

Again, will recognition of mistakes and failures not discourage pupils? Not necessarily and not usually. We have seen that it is a spur to action. It brings discouragement only when there is a recognition of two facts—(1) a mistake or difficulty, and (2) no known way out. Now, it is the business of the school to provide assistance in finding ways out—that is the function of school management. So if the school is doing its work, if the teacher is helpful and optimistic, there need be no discouragement and will be none.

Will this not make the teacher a scold? Not necessarily or likely. For if the method is worked properly—like, for instance, Spencer handles moral education through natural consequences of error, there is a good deal of fun in standing back and seeing a boy go through error to the point where he is shocked by his absurdity. Then, again, even where the teacher points out errors, he will become crabbed only when he is unsympathetic. If he is showing error with good will just because he wants the pupil to correct himself, there is no danger.

The plan of appealing largely to immediate interest has a predisposition in the hands of the average teacher to dress subject-matter up in attractive sensuous form so that a *superficial* interest is generated. Spelling is learned by picking words off a tree on the board. In teaching addition objects are used long after they are helpful. This is a tendency with teachers who cannot distinguish between immediate interests that should be appealed to and those which should not. So in the case of need—the thoughtless teacher will get hold of the idea sufficiently to give him justification for scolding and fault-finding. But there is all the difference in the world between *fault-finding* and *finding faults*. If the teacher is *sympathetic* and finds faults the pupil will improve; if he is a fault-finder, the pupil will get a distaste for school work—not because the teacher finds faults but because he lacks sympathy and good-fellowship.

Second. The need supplements interest. The feeling about interest is largely that school work should be made as pleasant as possible. That is how it works out in practice.

Not much place is given to the recognition of faults and difficulties. The need concept gives a very definite place in teaching to the recognition of these difficulties. It justifies the teacher in not only making the work as pleasant and interesting as practicable, but also in having the work hard, and in using the pupil's knowledge of difficulties as a legitimate means of getting interest.

Third. By the very nature of the need the pupil is better able to see the use and function of subject-matter. For, in feeling a need, he first has some value to control; he then sees that he cannot control the value, and, when he takes up the study of the subject-matter that will give control, he sees at once its use. The subject-matter learned under the stress of need cannot be isolated. The teacher may say, "Today we shall study these ten words in spelling," and the pupils will probably see no particular use for knowing how to spell them. But if in the written work that these pupils are doing errors are found and the words are given for spelling, some use is seen; they have failed in written work because of these words. And their interest in telling accurately what they know will make them feel both the use and the need of studying them.

Section 2. Generic Values

No matter what teachers think they can do or ought to do, it is impossible to keep activity from going in the direction in which it wants to go. The pupil must feel some value in his action, because if he does not he cannot do it. He may hate to take care of the baby, and can be persuaded to do so only through the fear of incurring tangible parental displeasure. But the fact that this stimulus makes him do it means that, though disliking it most vigorously, he wants to avoid sad consequences. In other words, he performs the hated action because he feels the value of doing so. And if no value of *any* sort could be seen in the action, if he did not care for anything else in the world that could be connected with this action, he not only would not, but could not do it.

There is no such thing as doing work in which one is not interested, or for which one does not have a need, implicit or conscious. Usually it is said that pupils have no interest in that which they are compelled to do. But, as a matter of fact, they have enough interest—mediate interest—to do it. The thing of immediate interest to them is to avoid punishment. A pupil may have no interest in keeping his face clean. The teacher may lead him to feel that by this he is missing the teacher's approbation. If the boy keeps his face cleaned for this reason, even if he has little interest in it, he has enough interest to make him do it.

Securing interest and having a need is not, then, so much a matter of some interest *versus* none, as it is a choice between good interest and poor interest. A pupil studies grammar to make the best grade in the room, to please his father, to avoid detention, or to learn to speak correctly. A pastor preaches to make a reputation as a pulpit orator, or to save the souls of sinners. A woman cooks to create an impression, or to give the family nourishing food. A girl learns a geography lesson from a sense of duty, or because it gives her useful information. In every case there is a need and interest; but the values which these things help to control are different.

Generic Values.—One class of values that operates with great frequency are generic values. This is a name given to those values which can be used in a great variety of situations and can be made the basis of motive in a large field of activity. Making good grades may apply as a motive in every subject in the course of study. Love of approbation is a motive that makes some children work at everything. Avoiding detention is a negative value which operates widely. Making a reputation (another form of love of approbation), doing one's duty, easing one's conscience, and a number of others, are generic in the sense that they apply with nearly equal force to every sort of situation.

Classes of Generic Values.—The *instincts* are a well-known class of generic values. Rivalry, sympathy, fear, constructiveness, play, curiosity and love of approbation, are some of those most commonly used in school. Fear will make many children do many sorts of things. Curiosity functions in many lessons and is a steady stand-by of the teacher. Some teachers teach everything through games.

These are motives to which appeal is easily made and because of that may be easily overworked. One teacher who taught geography in the fifth grade entirely by means of games and prided herself upon it, judged her success by the amount of excitement and superficial interest she could evoke. But, tested by the knowledge of the material and ability to use it, her pupils failed. Desire to please a teacher makes many children work, but when they leave school or are promoted to another room interest in school work may flag. They have no motive for further study.

The *virtues* may likewise be generic values. Duty, honesty, punctuality, cleanliness, thoroughness, reliability, honor, and unselfishness, apply to a wide range of subjects and situations. A sense of duty moves many to perform a wide variety of tasks. Thoroughness holds one to a task when other motives have ceased and maintains interest when it would otherwise have disappeared. Honor creates interest in certain situations, which, except for this sense, would be avoided. The virtues are really moral devices for regulating action along wise lines when superficial interests would tend to lead them astray.

Vices are likewise generic values. Doing what one wants to do, irrespective of the rights of others, greediness (taking more than one's share), and gratification of lusts are all felt to be values by those who practice them, though judged by objective standards they may seem to be valueless.

School incentives are generic values. The desire to be promoted, to make a grade, to be first to secure prizes and rewards, to avoid corporal punishment, to please the teacher, to escape detention, and to live up to class opinion are all motives widely if not wisely used.

These motives have to be selected with the greatest care, because being school motives they do not operate in quite the same form in adult life, and if pupils form the habit of relying upon them as a spur to action in school, they may have no spur to take their place in performing the drudgery and prosaic details of life.

Which Generic Values Should be Used?—Abstractly the question is easy to answer. Use the most permanent and the highest that will appeal to the pupils. Pupils differ at different ages in the motives that appeal most efficiently. Love of play is a good motive at one age, a poor motive later. Duty is an adult motive but not one that appeals to children, especially boys. Future success appeals to the adolescent, but not to his younger brother.

Appealing to adult motives in dealing with young children is a mistake often made by teachers. Children are not adults, and primitive motives and punishments often make an appeal where the refined motives of maturer years will not operate. Many a boy has been given a more wholesome stimulus to righteousness by the fists of an irate playmate behind the barn, than by miles of gentle homilies delivered by his respected mother.

Practically, it is hard to decide what motive to use in any particular case because children differ and situations differ. The teacher has to decide for himself which is the highest and most permanent motive that will appeal.

Section 3. Specific Values

The assumption in the use of these generic values, where they are the only motives to which appeal is made, is that all subject-matter is alike. The principle established in this text, however, is that each unit of subject-matter has a different use and should be taught when its specific use is recognized and needed.

Because of this it is necessary to consider the method by which a motive for studying one specific unit rather than another arises. These values and motives we have called specific to distinguish them from generic. And by specific values is meant simply this fact, that there are values, motives, needs, and interests which differ slightly from every other.

The need for a head-covering differs from the need for a neck-decoration. The need for a method of telling time differs from the need for fastening two papers together. And, in like manner, the subject-matter that satisfies the need is different in each case. The first has produced the hat, the second the necktie, the third the watch, and the fourth the paper clip.

It is evident, then, that if we are to teach subject-matter intelligently, using each unit where and when the particular need that demands it is felt, we have to pay attention to these specific values which each different unit was made to control.

When Use Generic Values?—Generic motives should supplement specific motives when the latter flag. A girl may be interested in making a table decoration. When she has partly finished, interest wanes. Then the teacher may appeal to some generic motive, such as doing well whatever is begun, or even fear of punishment if necessary. A boy may not be sufficiently interested in his school work to be on time. Other interests may conflict. Then the teacher may appeal to his desire for punctuality, or may stimulate interest in punctuality by other motives.

Classes of Specific Motives.—It is impossible to classify specific values in any useful way. Count over the little particular things that you think are valuable, and the task of cataloging them will be found to be impossible. In a broad way we have groups of social values, moral, intellectual, physical, æsthetic, religious, and practical values. And again, to repeat, each group is so large that its units cannot be enumerated. Since needs arise when failure to control these values occurs, there is an illimitable number of specific needs, each differing from the others. For instance, in controlling physical values, there are specific needs for an erect carriage, proper digestion, clean finger-nails, deep breathing, etc., etc.

From among this number the school selects the fundamental values and needs, the permanent and the temporarily important, and helps the child to satisfy them.

How to Create a Specific Need for a Unit.—The principle has already been stated. *First,* find the specific function of the subject-matter to be taught. Determine the value it was created to control. *Second,* see if this value is a value to the pupils to be taught. *Third,* if so, enable them to recognize that they cannot control this value; and, *fourth,* help them to turn to and conquer the subject-matter.

Perhaps the teacher wishes to take up the methods of curing mumbling in reading. The specific intrinsic function of these devices is to assist the child to convey a valuable meaning to other people. Assume that he wants to convey this meaning. Let him see that his interested audience cannot understand him. He will then try to correct his defect, and will to that end study methods of curing mumbling.

To "get the jump" on the other team will stop their charge. This is the function of "getting the jump." Let the team play against another team and be forced back because the other team got the jump. The defeated team will try to get the jump the next time they play games.

If we appealed to the generic values, we would assume that the mumbling reader wanted to do his duty, wanted to excel, to avoid punishment, etc. We would get him to recognize that if he did not cure it he would be neglecting his plain duty, would not excel, would be punished, etc., and would expect him to learn the tricks. The team would be supposed to have the honor of the school at heart, etc., and would be shown that the honor would be lowered if they did not "get the jump."

The advantages of the appeal to the specific motives is obvious. A definite use for the subject to be taught is seen.

Inasmuch as all the specific examples in the remainder of the text, no matter what problem of teaching is to be exemplified, will utilize specific motives, it is not necessary to illustrate them more fully here.

References for Class Reading

Angell, *Psychology*, pp. 63-66, 214-217.
Bagley, *Educative Process*, pp. 83-85.
Bagley, *Educational Values*, pp. 120-127.

Exercises

1. Give five illustrations of how a need is aroused for practical, out-of-school things.

2. How do you suppose the need arose for multiplication, for stocks and bonds, for weather maps, for botany, for alchemy, for windows, for furnaces? What in each case was the value, what the difficulty?

3. Select ten other objects of common use and state how you think the need arose.

4. Give five cases of where things were done in which the need may have been either implicit or felt. Describe the mental content in both the implicit need and the felt need in each case.

5. Give five cases of where you have been spurred to action by being made to feel your shortcomings.

6. Give five cases in which interest was secured in things because of superficial appeal to catchy interests. How would you have made a worthy appeal?

7. What do you think of corporal punishment as a means of making pupils do their work? Should it ever be used? If so, when?

8. Should an appeal be made to the children's desire to make good grades? If so, when?

9. What are the dangers in an attractive teacher using her attractiveness to make pupils work?

10. State five cases in which a teacher might have used an appeal to specific values instead of making an appeal to generic values. How?

11. Recall the methods of each grade teacher that you have had and see whether the appeal was made to specific use of subject-matter or to generic values. Be very careful in your report.

CHAPTER XI

MOTIVE—(Continued)

Section 1. Active and Potential Motives

If subject-matter is not to be presented to children until they feel the specific need for it, what shall we do with important subject-matter for which they feel no need? There are three answers to that question, all of which depend upon a distinction to be drawn between two classes of needs—active and potential.

A potential need is one not felt, but such that it can be felt by the pupils. The suggestion of the need by the teacher or by the class will call it into action. A man has, perhaps, never felt any need for repainting his house, but it is possible that he can be made to do so. A boy has never felt the need for being honest, but he may be made to feel it. A pupil has never felt the need of knowing arithmetic, but he, in turn, may be made to feel it. The pupils may easily be put into many situations in which the sense of need can be developed.

Sometimes, however, no need may be felt, nor can it be aroused. It is hard to make a Hindoo feel that he needs skates, some farmer that he needs an automobile, a woman that she needs a pair of brogans. Frequently boys cannot be made to feel the specific and intrinsic need for Latin or for cooking, just as it is impossible to make some girls feel any need for algebra or physics.

There are, then, three possible cases. A need may be felt; it may not be felt but may be potential; it may not be felt and may not be potential.

To the question above, Should children study subject-matter for which they feel no need? the answer is, If the intrinsic need is potential, they should; if it is not felt and cannot be aroused, they should not.

This contradicts many teachers who feel that things for which the intrinsic need is not now felt should be taught because they will be of use in later life. One argument is sufficient to meet this position. We know from the psychology of memory that if a thing is learned and is not used for years it is sure to be forgotten. How many men can remember one-tenth of what is in a text-book whose subject-matter they have not used since they left school? Learning things that are not immediately useful means that we temporarily load the memory with junk which will be a present encumbrance and, before the time for using it arrives, will have been unloaded.

One can always create a *generic* need for any subject-matter. Tell a sensitive boy to learn the Chinese alphabet or he will be thrashed, and he will do it. There is always present *some* potential generic need which can be turned upon any subject. But in the answer to our question we were speaking only of specific needs.

Section 2. The Problem as Motive

Within the last three years a very considerable body of literature has sprung up around the place of problems in teaching. Previous to that time writers talked about the aim or the topic of the recitation.

The problem is simply one phase of need. When the need emerges it gives rise to the problem of satisfying the need. If one needs bread, his problem becomes that of securing bread. If a boy needs a saw, his problem is to satisfy the need and secure the saw. If a pupil needs to learn a rule in grammar, his problem becomes that of learning it.

Just as we say each unit of subject-matter was created to satisfy some need, we also say it was created to solve some problem.

The difference between need and problem is chiefly this, that the need has feeling in it, while the problem is purely intellectual. This is evident in the two statements: He needs to earn money, and, his problem is to earn money. The second is intellectual—no feeling. The first has much that the second does not have, and this additional element is chiefly feeling. Literature satisfies needs and does more than merely solve problems. If it merely solved problems, literature would be only a matter of information. But it is more; it is satisfying. *Hamlet* solves a problem; it also satisfies a need.

Origin of Problems.—The conditions under which a problem arises are the same as those under which a need arises. We have first something we wish to do, then an obstacle to doing it; and this gives rise to the problem.

There are several types of situations in which problems arise. Of these, a few of the most important will be mentioned here.

Habits. — Problems arise when familiar methods of doing things fail. To lace my shoe uses a series of movements, so that I need pay no attention to it. I break the lace. Then a problem arises as to how to get my shoes laced *now*. A child works a problem in multiplication largely by habit. He checks it and finds that he is wrong. The problem of correcting it arises. A boy has been accustomed to working on the principle that 1 man can do twice as much work in 2 days as in 1 day. He is given the problem, How long will it take 2 men to do a piece of work if one does it in 1 day? Applying the same principle, he will answer, 2 days. But this means, so he is told, that 2 men take twice as long to do a piece of work as 1 man does. He sees the absurdity and a problem arises.

Conflict Among Ideas.—Adams[1] says, "The ideas within the mind must be at peace with each other. The moment friction arises there must be ceaseless activity till the disagreement is removed. Consistency among the ideas is an essential to quietness of mind. All the mental content must be harmonized; there must be no contradiction in the arrangement that has been imposed upon the ideas."

When the teacher makes use of this principle in teaching, Adams calls it Confrontation.[2] That is, the teacher may raise a problem by confronting two ideas which are within the pupils' experience but which are contradictory. For instance, in teaching the siphon the teacher may ask the pupils, "Does water ever run up hill?" The pupils will reply, "Of course not." Then the teacher may set a working siphon on the table, and all that is necessary to say is, "Well, how about this?" Here an old accepted idea is met by a fact in plain sight. And there will be no rest until the two are reconciled.

Adams gives four or five cases,[3] of which the following is interesting for the reason that the teacher as well as the pupils were confronted by inconsistencies: "A teacher, giving a lesson to a young class on a bluebottle, asked how the creature made its familiar buzzing noise. When she received an answer, she told the children that she expected

[1] *Exposition and Illustration in Teaching,* p. 75.
[2] Op. cit., p. 79.
[3] Op. cit., pp. 75-84.

that answer. Of course they thought the bluebottle buzzed with its mouth, because when they wanted to buzz they did it with their mouths. Accepting the teacher's word that they were wrong, the class had no peace till she told them that the buzzing was caused by the wings. This gave the children perfect satisfaction, as it did the teacher, till her Normal instructor pointed out that if you remove the bluebottle's wings it does not stop buzzing, but actually buzzes a little harder than usual. It was now the teacher's turn to be worried, and it was not till she had learned about the special little buzzing organ[1] that she could drop the subject and be at peace once more."

A teacher is teaching commission. The pupils have just solved this problem: What is an agent's commission for selling $3000 worth of goods at 1%? The teacher slips in the following problem without explanation: A man sends $2500 to a commission agent out of which to buy goods after deducting the agent's commission of 2%. What was the agent's commission? Invariably the pupils will answer, $50. To confront them with their error the teacher may say, "How much did the agent invest?" Answer: $2450. "Then, what is the commission on $2450 at 2%?" Answer: $49. "But you found just a moment ago that he received $50. Now you say $49. This is a pretty state of affairs for a strong arithmetic class—getting two answers that are not alike."

Concrete Activities.—The problem can be made to stand out prominently in work done with tangible materials, such as wood, iron, cooking materials, etc. A domestic science pupil may not see any problems in preliminary work on foods. But if she makes muffins which are soggy,

[1] Discovered by Landois. T. H. Huxley: *Anatomy of Invertebrated Animals,* p. 377.

a problem comes unmistakably into consciousness. So with woodworking. The difficulties are evident to the eye. All work that can be "put down in black and white" is exceptionally good for making the pupils realize their difficulties.

Curiosity.—The desire to know what is not known just for the sake of knowing it is a deep-seated tendency of human kind, and, to a less degree, of all the other higher animals.

Earhart[1] says, "A prolific source of problems, whether in school or out of it, is curiosity. We wonder *why,* or *how,* or *what,* and reach out in other directions for more knowledge. This curiosity may be an idle, fleeting kind, which, left to itself, would result in little effort and progress. It may be of a primitive nature, not being based upon previous knowledge. A teacher appeals to primitive curiosity when he leads his class to desire to hear a story they have never heard before, or to see something new. He arouses expectation and desire which are directed towards unknown objects. Rightly valued and employed, however, curiosity may be made a valuable agent in education.

Intelligent curiosity, which is based upon partial knowledge, which reaches out to some definite end, and which leads to some adequate method of attainment of that end, cannot be over-estimated as a means of development and training. Consequently the suppression of curiosity just because it is curiosity, or the rejection of a method just because it appeals to curiosity, is short-sighted. The appeal to curiosity is justifiable, but it should lead to some intelligent end, and not remain upon the level of mere idle wonder.

A teacher may have in view the teaching of an important lesson in some subject; she may lead the children to approach it by appealing to a curiosity initially connected with

[1] *Teaching Children to Study,* pp. 11 and 12.

some superficial fact. The explanation of that fact leads into the subject step by step, until, when the lesson period is over, the teacher's aim is accomplished. A lesson on glaciers may begin with the observation of markings on rocks, or the discovery of boulders in the soil. The question arises, 'How did they come to be there?' and in answering it the subject of glaciers is taught. A comparative study of cotton and wool might be introduced by the question as to why wool was used before cotton for making cloth. Similarly in other subjects, some fact may be brought to the attention which provokes the curiosity and tends to direct thought into desired channels."

Discipline of Natural Consequences.—Spencer applied the principle we have been working with here. He calls it the discipline of natural consequences. He says in effect: Parents obtrude themselves too much into the moral education of their children. What they should do is to let the child go ahead and do the wrong act, and then see that the natural consequence of this act is visited upon him—this natural consequence, being painful, will make him halt and thereafter he will do the right thing. For instance—he says, if a child makes a litter the natural consequence is not that the mother should scold and then pick up the articles; rather, it is that the child should pick them up himself. If a girl is not ready to take her walk with her mother, the natural consequence is that she stay at home.[1]

Most teachers, like most parents, push themselves too much into the learning process. They are too ready to say, "That is wrong," instead of letting the pupil go on until *he sees* that he is wrong. A sentence was given for analysis: High flew the spray above their heads. The teacher said, "What is the subject?"

[1] Spencer, *Education*, pp. 162-213.

"High," answered a boy.

"What is the verb?"

"Flew."

"Object?"

"Spray."

"Is flew transitive or intransitive?"

"Intransitive."

"How can it have an object?"

No answer. (He saw that he had made an error somewhere and was ready to begin over again.)

This is better than for the teacher to have said "Wrong" after the boy said that the subject was "high"; for now he does not have to accept the *ipse dixit* of the teacher; he *sees* that he is wrong.

Then, again, most teachers do too much preliminary explaining. We have been taught disastrously to divide a lesson into such little steps that the pupil can go along easily. For instance, in the transition to the new type of commission problem from the first given above, teachers usually stop and say, "This is different, it differs in such and such particulars. Before we begin to work them let us take a few easier problems, etc."

The writer believes that it is better to slip the new type in without warning. The pupils go blithely ahead using the old plan, they are brought up sharp, and then they see the use of the teacher's explanations, because they see that they have made a mess of their work.

Three-quarters of the preliminary explanations is wasted breath. You want to learn to ride a bicycle. Your experienced friend delivers a long homily on how to do it. He is, in fact, glad of the opportunity to give the advice. You listen, do not know what it all means, feel that this is an unusually intricate business, and are itching to start. When you get on you forget all that he has said—and flounder. The best advice he can give you is, "Get on and ride." You do so. Then you begin to ask questions, "How do I place my feet? etc." And now, when he gives you all the information he might have given you before you started, you see the use of it and can profit by it.

If we are to keep education free from the stigma of "spoon feeding" we must give the growing boy some difficulties to master which at the start are just a little bit bigger than he is. We can help him out after he has gotten into them. Though often if we give him a chance we find that he has more brains than we thought he had.

Facing difficulties about our size is most exhilarating. Doing little easy things is very tiresome. If you want people to work for you give them something to do so hard that it will extend their powers. It fires the imagination, calls forth all the energies of mind and muscle, and, in short, is fun.

Facing difficulties without preliminary advice is also exhilarating. Mother says, "Don't do that, Willie, or you will get hurt." It is much better (within reason) to say, "Go ahead, Willie, and see what happens." The shock shows Willie that it would be better to leave "that" alone. To him this shock is both efficacious and thrilling. There is a world of significance in his remark, "I *sure* won't do that again." He is feeling the effect of the discipline of natural consequences.

Section 3. The Problem and the Statement of Aim

Teachers acquainted with the Herbartian *Five Formal Steps* will remember that in the step of Preparation the aim of the lesson is stated. "The *third* precaution in this step [Preparation]," say the McMurrys,[1] "is fully as important

[1] *The Method of the Recitation*, p. 105.

as either of the other two, and, in fact, conditions the success of both; it requires the *statement of the aim*. The attention of pupils must be centered quickly and fully on the work undertaken." The aim of the recitation should be stated at the outset.

It is impossible in application of the *Five Formal Steps* to get away from the fact that the standpoint looks upon each unit of subject-matter as relatively isolated. The teacher is advised to state what he is going to take up with the pupils. To be sure it must be along the line of the pupils' direct interests. But in this plan there is no necessary connection with the pupil's past, to say nothing of his present, except that which is made through review of the past by the teacher.

On the other hand, the idea of beginning a lesson only when a problem or need is present, implies a change of point of view from a unit of subject-matter selected and "made interesting" to the pupils, to a consideration of the pupil and his difficulties. The subject-matter in the second case becomes secondary to the needs and problems, to the values of the pupil's experience.

As Bagley says,[1] "the aim [of the lesson] should . . . relate the forthcoming subject-matter to the needs of the child; that is, *it should seize upon some need and show how it may be satisfied.*"

There is a wide difference between *stating* the problem of a lesson and *raising* the problem, and a still wider difference between the teacher's stating an aim and the pupils' realizing a problem. If a teacher raises the problem he goes back to values the pupil has, and presents difficulties. After the problem is raised it ought at times to be stated for the sake of clearness. But its statement ought never to be forced. The teacher ought never to state it unless he is

[1] *The Educative Process*, p. 292.

sure that it is a *real* problem; i. e., is closely related to the values of the pupil.

Instead of saying that the first thing in the lesson is the statement of the aim, it is preferable to say that the first thing is to raise the problem or to arouse the need.

Summary.—In this and the two foregoing chapters we have tried to show that children have certain native and immediate interests and values which determine the direction that their activity is to take. It was pointed out that there were potential interests and values which could be made active. It is the business of teaching to make the potential become active, and to assist the pupils to secure efficient control over the most important interests and values. To do this subject-matter is used, subject-matter for which there is often no motive until the pupils recognize the necessity of learning this subject-matter in order to acquire control over their immediate interests. This recognition of lack of control on the part of the learner is called need. The problem is related closely to need. And both are necessary motives for the acquisition of new subject-matter. These needs may be generic or specific according to whether the values to be controlled are the great intrinsic values which provide motives in all phases of life, or are values differing each from the other for the control of which each specific unit of subject-matter has been constructed.

References for Class Reading

Adams, *Exposition and Illustration in Teaching*, pp. 75-85 and 171-184.

De Garmo, *Principles of Secondary Education*, Vol. II, pp. 21-27.

Dewey, *How We Think*, pp. 68-74.

Earhart, *Teaching Children to Study*, pp. 7-21.

Miller, *Psychology of Thinking,* pp. 115-129.
Spencer, *Education,* pp. 175-189.

Exercises

1. Give five cases of potential needs made active. State how each was made active.

2. Explain how the orator makes potential needs active. Why is the orator so successful in this?

3. Of what use are radicals and reformers in making potential needs active?

4. State two great needs of adult life that are absent in early childhood, potential in adolescence, and active in maturity.

5. What do you think of the proposition that pupils should learn many things for which they have no use at the time but which will be useful in after life? Name ten things studied that have this as the reason for being taught.

6. Give five cases of where a problem in your thinking has arisen because some long accepted belief has met with facts that contradict it. Did you feel worried about any of these before getting them settled?

7. Describe something you have done recently in which you have met with a whole series of problems as you carried it on.

8. Give five cases in which the plan of allowing pupils to make statement, and then carrying them on till they saw that they were wrong, worked.

9. What are the limitations to the application of the discipline of natural consequences?

10. McMurry says that the statement of the aim should have five characteristics (*The Method of the Recitation,* pp. 107-111). If you are careful to raise the problem out of the child's experience will the teacher obey these rules unconsciously or not?

CHAPTER XII

CONTROL OF VALUES

SECTION 1. METHODS OF CONTROL.

Illustrations of methods of securing motives will be deferred until the control of values and the systematized and incidental study of subject-matter is discussed, because they are so closely bound together that much duplication will thereby be avoided.

Classes of Control.—In this chapter we shall first discuss the methods of control that are worked out and later the way in which they are worked out.

The first may be stated in the form of a question: What are the methods of control that any individual has at hand when he attempts to secure this control?

The answer is supplied by Bagley, whose classification will be followed here.[1]

Inherited Controls.—Every pupil has at his command certain instincts and reflexes which control values for him. One excellent illustration of instinctive control is found in imitation, which operates all through life and is particularly strong during the early years of school. Flight is another inherited method of control when some value is in jeopardy. Simple reflexes such as winking the eyes at the approach of foreign substances are also useful. The great rhythmic reflexes such as circulation and respira-

[1] *Educational Values*, pp. 1-77.

tion are invaluable methods of sustaining and improving life.

Acquired Controls.—There are four main classes.

Specific habits become automatic. Writing is largely a habit. I have an idea, take a pen and start to write. The reaction is automatic. A carpenter is making a box, he picks up a board and a saw. No attention is paid to the way the handle is gripped or to the muscular to and fro movement because habit controls it automatically. Other illustrations are unnecessary. A very large percentage of all values controlled, are controlled by habit.

Knowledge is a second type of control. Ideas, facts, principles are stored and utilized when the appropriate occasion arises. Damp feet induce a cold, mere book-learning is ineffective, matches should not be thrown in the waste-paper basket, America was discovered in 1492, beware the gift-bearing Greeks, automobiles are expensive, are random illustrations of facts and principles which control our actions. Electricity, furnace, typhoid, mosquito, flies, are ideas, knowledge of which likewise influence action. All knowledge, whether accurate or inaccurate, influences action.

Ideals are values and in a way determine methods of control. Ideas are intellectual: ideals are emotional. Ideals of honesty, accuracy, thoroughness are charged with feelings. And they affect action. I need one thousand dollars. I might steal it. But the ideal of honesty negatives that method of control.

Prejudices, tastes, and *attitudes* control conduct. Of course, prejudices may be either good or bad. It is an excellent thing to have a prejudice—a bent—toward honesty just as it is bad to be prejudiced against a foreigner because he is a foreigner. Tastes in like manner are good or bad.

Attitude is a term that properly includes tastes and prejudices.

The important thing about all these methods of control is that they are forceful and effective as actual methods of control; and the more intangible are probably more powerful than mere knowledge. One's prejudices and attitudes toward life are often contrary to what he knows. But generally speaking, where prejudices and knowledge conflict prejudices win out. It is almost impossible to make knowledge conflict with prejudices because there is an inborn tendency to see in any situation what we want to see.

Hence it is more important that attitudes, tastes, prejudices and ideals are effective and right than that they should be wrong and knowledge and information be extensive and accurate.

The teacher gets the pupils with their prejudices already formed or in a process of formation outside school. If he seeks only to give information, he will have little forceful influence in their lives. But if he uses information and repetition in such a way as to batter down inefficient prejudices, tastes, attitudes and ideals and nourish and protect efficient ones, he may hope to perform an effective educational service.

The important pedagogical question remaining is, How are these acquired controls acquired? (The instincts and reflexes are, of course, not acquired by an individual; they are inherited.) This process will be discussed in the next section and will be found to involve the principles already elaborated in the text.

Section 2. Analysis of the Process of Control

Needs.—Habits, knowledge, ideals, prejudices, tastes and attitudes arise in response to needs. This we have discussed in part. All these methods of control just mentioned are ways of acting, thinking, and feeling, and, as has been shown, habit and knowledge are the result of dissatisfaction with other habits and earlier lack of information. Prejudices, likewise, are fallen into because they seem to handle the situation well. A boy may belong to a group in which the opinion is openly held that any boy who will not lie to shield the group is a coward. The desire to stand in with the group, superinduced by the knowledge of what will happen if he does not, compels him to accept this prejudice as his own, and repetition weaves it into the body of his tissue of prejudices and attitudes toward life.

Even though information and habits are picked up at random, they are acquired bit by bit, and each bit if carefully analyzed will be found to have some need as its motive.

Problem.—We have just seen *when* the new subject-matter is acquired. It is gained at a time when there is a need for it. If we inquire *how* it is acquired, we shall get the best assistance from books by studying the methods by which problems are solved. How problems arise and their relation to need were discussed in the last chapter. How they are solved will be treated at this point.

Case 1. In arithmetic we have problems like this: How much U. P. preferred at 150 can I buy for 2000 shares of U. S Steel common at 67, brokerage 1/8?

The directions the pupils follow are:

(1) What is to be found?
(2) What is given?
(3) Solve.
(4) Check up.

The pupil works through as follows:

(1) To find number of U. P. shares.
(2) Given a) U. P. shares at 150 (to buy).

b) 2000 shares of U. S. Steel common at 67 (invested).

c) brokerage 1/8.

(3) Solution.

2000 shares U. S. Steel at 67	=	134000
Brokerage	=	250
Net proceeds	=	133750
1 share of U. P. pref.	=$	150
Brokerage on 1 share	=	1/8
Gross price per share	=$	150 1/8
Amount to invest	=	$133750
Number of shares = 133750 ÷ 150 1/8	=	$890\frac{1130}{1201}$

(4) Check $\dfrac{(890\frac{1130}{1201} \times 150\frac{1}{8} + 250)}{67} = 2000$

Case 2. In algebra we may have an example like this:

Solve $X^4 + X^2 - 2 = O$

The pupil will proceed as follows:

1) To find factors

2) Given a) equation as stated

b) certain rules for solution

3) a) throw into form of quadratic

$X^4 + X^2 - 2 = O$

$(X^2)^2 - (X^2) - 2 = O$

Factor by trial

$X^2 + 2$

$X^2 - 1$

$(X^2 + 2) \ (X^2 - 1) = O$

Again, factor

$(X^2 + 2) \ (X - 1) \ (X + 1)$

Again,

$$X^2+2=0$$
$$(X^2-\sqrt{-2})^2=0$$
$$(X-\sqrt{-2})\ (X+\sqrt{-2})\ (X-1)\ (X+1)=0$$
$$\text{Roots} = +\sqrt{-2},\ -\sqrt{-2},\ +1,\ -1$$

or (3) could be carried on by the longer method

$$X^4+X^2-2=0$$
$$X^2=\frac{-1\pm\sqrt{1+8}}{2}$$
$$=\frac{-1\pm 3}{2}=-2 \text{ or } +1$$
$$X^2=-2 \text{ or } 1$$
$$X=+\sqrt{-2},\ -\sqrt{-2},\ +1, \text{ or } -1$$

Checking X^4+X^2-2

$+\sqrt{-2}$

$-\sqrt{-2}$

$+1$

-1

$$(+\sqrt{-2})^4+(\sqrt{-2})^2-2-$$
$$4-2-2=0$$
$$(-\sqrt{-2})^4+(\sqrt{-2})^2-2=0$$
$$4-2-2=0$$
$$(+1)^4+(+1)^2-2$$
$$1+1-2=0$$
$$(-1)^4+(-1)^2-2=$$
$$1+1-2=0$$

Case 3. A few weeks ago my wife reported to me that some bugs were stripping the tomato vines. I here had a problem. I was supposed to find a method of destroying the bugs. A visit was made to the garden to see exactly what the pests looked like. They were very large and seemingly very hungry. What elements were given? In this case a rather hazy knowledge of poisons—and the bugs. I consulted my neighbor who was an expert horticulturist. His advice was to knock them off one by one and kill them, since they enjoyed and seemed to thrive upon all known poisons. This I tried, there, fortunately, being few. The vines were not molested further, as was shown by occasional examination.

Here again we have the old form of the arithmetic problem, something to be found, something given, a solution, and the checking up. Only in this case the solution was found by asking some one else, and the checking up was done by *watching* the plants to see if the solution (the killing of each bug) was successful.

Case 4. The first born, aged sixty days, cries at 2 A. M. The fond and devoted parents rise to stop the wails. Perhaps it is cold. Rapid searching determines that it is warm. Perhaps the colic? No, its feet are warm. Maybe a pin. No, only safety pins are used. Can it be lonesome? Happy thought. The male parent takes it in his arms and walks the floor. "The tumult and the shouting dies"—the baby sleeps.

Here we have again a problem, little knowledge, several guesses at a solution and a checking up. Probably later better solutions and more accurate theories will be applied. But for the present walking the floor is a satisfactory solution.

Case 5. The following extract gives a graphic account of a state of mind that is too common in our schools. It is taken from a school story called *The Rickerton Medal,* which is the work of a practical teacher. The scene is a class room in an elementary school. Mr. Leckie, the teacher of the class (Standard VI, average age about 13), propounds a problem in arithmetic:

"If 7 and 2 make 10, what will 12 and 6 make?"

A look of dismay passed over the seventy-odd faces as this apparently meaningless question was read. Everybody knew that 7 and 2 didn't make 10, so that was nonsense. But even if it had been sense, what was the use of it? For everybody knew that 12 and 6 make 18—nobody needed the help of 7 and 2 to find that out. Nobody knew exactly how to treat this strange problem.

Fat John Thompson from the foot of the class raised his hand, and when asked what he wanted, said:

"Please, sir, what rule is it?"

Mr. Leckie smiled as he answered:

"You must find out for yourself, John; what rule do you think it is, now?"

But John had nothing to say to such foolishness. "What's the use of giving a fellow a count[1] and not telling him the rule?"—that's what John thought. But as it was a heinous sin in Standard VI to have "nothing on your slate," John proceeded to put down various figures and dots, and then went on to divide and multiply them time about.

He first multiplied 7 by 2 and got 14. Then, dividing by 10, he got $1\frac{2}{5}$. But he didn't like the look of this. He hated fractions. Besides, he knew from bitter experience that whenever he had fractions in his answer he was wrong.

So he multiplied 14 by 10 this time, and got 140, which certainly looked much better, and caused less trouble.

He thought that 12 ought to come out of 140; they both looked nice, easy, good-natured numbers. But when he

[1] Scottish: any kind of arithmetical exercise in school work.

found that the answer was 11 and 8 over, he knew that he had not yet hit upon the right tack; for remainders are just as fatal in answers as fractions. At least, that was John's experience.

Accordingly, he rubbed out this false move into division, and fell back upon multiplication. When he had multiplied 140 by 12, he found the answer 1680, which seemed to him a fine, big, sensible sort of answer.

Then he began to wonder whether division was going to work this time. As he proceeded to divide by 6, his eyes gleamed with triumph.

"Six into 48, 8 an' nothin' over, -2-8-0 an' no remainder. I've got it!"

Here poor John fell back in his seat, folded his arms, and waited patiently till his less fortunate fellows had finished.

*   *   *   *   *

James[1] knew from the "if" at the beginning of the question that it must be proportion; and since there were five terms, it must be compound proportion. That was all plain enough, so he started, following his rule.

"If 7 gives 10, what will 2 give?—less."

Then he put down

7:2::10:

"Then if 12 gives 10, what will 6 give?—again less." So he put down this time

12:6

Then he went on loyally to follow his rule: multiplied all the second and third terms together, and duly divided by the product of the first two terms. This gave the very unpromising answer 1 3/7.

[1] The clever boy of the class.

He did not at all see how 12 and 6 could make 1 3/7. But that wasn't his lookout. Let the rule see to that."[1]

Dewey[2] quotes a more complicated case: "In washing tumblers in hot soapsuds and placing them mouth downward on a plate, bubbles appeared on the outside of the mouth of the tumblers and then went inside. Why? The presence of bubbles suggests air, which I note must come from inside the tumbler. I see that the soapy water on the plate prevents escape of the air save as it may be caught in bubbles. But why should air leave the tumbler? There was no substance entering to force it out. It must have expanded. It expands by increase of heat or by decrease of pressure, or by both. Could the air have become heated after the tumbler was taken from the hot suds? Clearly not the air that was already entangled in the water. If heated air was the cause, cold air must have entered in transferring the tumblers from the suds to the plate. I test to see if this supposition is true by taking several more tumblers out. Some I shake so as to make sure of entrapping cold air in them. Some I take out holding mouth downward in order to prevent cold air from entering. Bubbles appear on the outside of every one of the former and on none of the latter. I must be right in my inference. Air from the outside must have been expanded by the heat of the tumbler, which explains the appearance of the bubbles on the outside.

"But why do they then go inside? Cold contracts. The tumbler cooled and also the air inside it. Tension was removed, and hence bubbles appeared inside. To be sure of this, I test by placing a cup of ice on the tumbler while the bubbles are still forming outside. They soon reverse."

[1] Adams, *Exposition and Illustration in Teaching*, pp. 176-8.

[2] *How We Think*, pp. 70-71.

Case 7. Goodyear, the discoverer of the process of vulcanizing rubber, worked for ten years before he struck upon the complete process.

We are told that he went to New York to dispose of an idea for a life preserver and while there he was advised by a rubber merchant that if some way could be found for making raw rubber withstand both heat and cold so that it would not be sticky in warm weather nor would crack in cold weather, there was a fortune to be made. He had little knowledge of mechanics or chemistry but was nevertheless interested in the problem, and upon his return he set to work to discover the process.

There is great human interest in his story, in his privations and poverty inflicted upon himself and his family while the idea obsessed him. This we cannot describe here. But the main features of his solution can be given.

His biographer states that he first tried mechanical mixing and kneading of the warmed raw product, but it still remained sticky in warm weather. Then he tried mixing various chemicals, such as magnesia, with the raw material while kneading. This likewise proved unsuccessful. Then he tried boiling this magnesia mixture in quicklime and water. This worked for a while under his limited tests but it was found that any acid, even of very slight strength, such as apple juice, produced the troublesome stickiness. He next tried mixing it with nitric acid, and his hopes were raised so high that he tried to get, and indeed secured, a government contract for making rubber mailbags. Here, however, he found that the heavy material needed for the bags broke, cracked, and still produced stickiness. This almost completely discouraged him, but he continued, and among many other things tried kneading sulphur into the raw product. His results were better but not successful.

The final idea came by accident one day, when in talking to a friend by the kitchen stove, he let the piece he was displaying drop on the stove lid. As soon as he could he scraped it off, but not soon enough to keep him from seeing that the heat, combined with the mixing of the sulphur, had added the necessary factor. After a time he perfected conditions for heating, and to-day we have vulcanized rubber, though the inventor, with his meagre business ability, reaped a very slight reward for the privation and destitution of his family and himself.

These seven instances have been given to show concretely the processes by which control is reached. Summarized, there are three main steps in the process: the recognition of a problem, an attempt at its solution, and testing it out. The first is called defining the problem, the second forming hypotheses, and the third verification.

A very simple process, this, in the abstract, but frequently difficult to apply successfully to concrete situations.

Defining the Problem.—When a problem faces a person it is frequently indefinite. He knows that something is wrong, but before he can go ahead intelligently he must know more exactly just what is the problem. In the arithmetic problem above, the thing desired is to find how much U. P. stock can be bought; but more exactly it is to find the amount of U. P. stock that can be bought for U. S. Steel, with brokerage on both transactions. In the algebra example the problem is to solve the equation, but it narrows down to the problem of factoring. The problem of the tomato plants was to keep them from being stripped; more definitely it was to get rid of the bugs, still more definitely how to exterminate them, and later how to knock them off and kill them. The parents with the baby had the problem of quieting it, more definitely, they wished to know what was the trouble, and finally by chance they hit on a method without ever knowing quite what the trouble was. Adams' boys had not the least conception of any problem. They worked out blindly till they reached something. Dewey's student had the problem of explaining the presence of bubbles, then of bubbles inside and outside. Goodyear had the big problem of making rubber commercially usable, more definitely he had to determine how to keep it from being sticky and cracking.

Except in the very simplest cases this process of definition is gradual. To an experienced doctor the diagnosis of many diseases is easy. He enters the room, sees the temperature, takes a pulse, feels the painful parts, and at once says, "It is so and so." An inexperienced doctor has to work it down point by point until he knows exactly what is wrong. The amateur whose motor stops knows first, that something is wrong, and his chief trouble is in locating the difficulty. An expert may look it over and say at once: "You had better put in your spark plug." If a boy is troublesome in school, the teacher's difficulty is to know just what is wrong. Is this nervousness, bad air, poor health, or just meanness?

The Hypothesis.—When the problem is being located guesses are beginning to form. In the arithmetic problem, the pupil is figuring out the method of handling it. So in the algebra question. When my wife mentions stripped tomato vines I at once think: "Bugs—how shall I kill them; surely by poison." But I have heard that there is one kind of bug that ordinary poisons will not kill. So I discard that hypothesis and consult the expert. When the baby cries the parents think of a hot-water bottle, or of putting it on its stomach and dandling it up and down on parental knees, or running over the clothes to find misplaced pins, or of walking up and down. These all *naturally* suggest themselves.

How we happen to hit upon these hypotheses is not clearly known. We may say we make associations but that explains nothing. If we had a rule for reaching these guesses easily and unfailingly, inventors would starve more extensively even than they used to, for every man could be made original by training.

Some people have a knack for making wise guesses. Others, by effort, can never do it. But for the ordinary person, pupil or adult, there is no royal road. We have just to sit down and think about it. Miller says: "All that we can do in the way of controlling this part of the thinking process is to familiarize ourselves so thoroughly with all the facts relevant to our problem that we are in the mental mood, or attitude, for the associative mechanism to work freely through all the material, and to suggest subtle relationships which we have not hitherto suspected, or to bring out into reflective consciousness connections which had hitherto been vague and unreflective." We have to go over and over the material, try out any likely guess, and perhaps some time the right hypothesis will pop out of nowhere. Goodyear, for instance, by accident let the rubber fall on the stove. Archimedes, we are told, took a swim. The mind bent on solving a problem is no respecter of places. It keeps turning things over and over.

Our trouble as teachers is that in 90 per cent of the cases we do not let the pupils do enough thoughtful guessing. We are not exactly anxious to show off our knowledge to the pupils. It is not really that we are so good-hearted that we hate to see them worried or confused. This is largely because we are in a rut made by countless generations of book teachers who have assumed that the human mind is a barrel into which should be dropped little portions of learning. But no pupil ever amounts to much who does not wrestle with unsolved problems. Fortunately for the generations as they rise, they get a good deal of practice in this outside of school. But is it not a shame that the school which is manned with experts in education should so completely neglect this phase of human originality?

Good hypotheses may be found on the first trial. In the arithmetic question, if the pupil has worked a good many similar problems he may hit upon the right solution at once. The more familiar a student is with his problem the more likely is he to judge right the very first time.

But again the correct trial may be the last of a series. Goodyear worked for ten years to achieve the guess that made him a benefactor to the race. Many a boy has worked for days upon a problem of geometry, trying first one and then another, before getting the correct solution.[1]

In Scott's book on *Social Education,* mentioned above, in Chapter VIII, we have a fine set of concrete examples showing how children work out their own solutions. For a certain period in the day, the pupils were allowed to select their own problems and to work them out in groups with the understanding that what they did was their own affair, and that they should call in the teacher only when it was absolutely necessary. It would be impossible to give an adequate description of the work in our few pages. But references for class reading are given at the end of this chapter.

Verification.—How do we determine which is the correct hypothesis? In mathematics we check, and if this process is satisfactory we consider the solution reached to

[1] In ordinary language the correct hypothesis when carried out and put into practice is called the solution.

be correct. This is a highly intellectualized and exact method of determination. There is no possible loophole for error to creep in if the method is correctly used.

In certain other exact work with concrete materials, such as in cabinet making, verification is made by seeing if the apparatus works. A plan for making a joint is supposed to be correct if the joint does all that is expected of it. In a rough and tumble political debate a picturesque old gentleman discredited his opponent as follows: "My learned opponent has brilliant ideas other than those he is now giving voice to. Once he made a mouse-trap, by scientific methods; it looked pretty; it was pretty; it was painted and made out of first-class wire—a perfect mouse-trap—with one exception. He never *could* persuade a mouse to go inside."

Again, in cooking, verification is determined to a great extent by palatability. If the bread tastes good, it is supposed to be well made. The cook in trying to make a new dish makes guesses as to amounts of ingredients, heat, and time of cooking. It is a success if it pleases her guests. So with painting and all forms of aesthetic problems, the solution is correct if it pleases the taste of those who know. Color schemes are hypotheses—very much so. And they are successful if when carried out they produce a pleasing effect.

These standards of taste are not so rigorous as mathematical standards; for the old proverb still holds true: *De gustibus non disputandum est*—one can never argue about tastes. Hence the opinion of experts in any line is accepted as the court of last resort.

In more abstract fields, verification consists in lack of contradiction. When a scholar reaches a conclusion, i. e., arrives at what he thinks is a good hypothesis, he stops and tries it out in every possible case to see if there is anything that contradicts it. Darwin says, in his autobiography, that his attention was always riveted by what seemed to be a possible objection to his theories. It is in this way that a careful student checks up his work. We are told that Newton laid aside his theory of gravitation because certain measurements about the moon contradicted it. Twenty years later other investigators made more accurate measurements which coincided with Newton's theories, and, this final objection being removed, he made his theory known to the world.

In seeking for possible objections, the scholar will not wait for them to come. He goes out after them. He seeks for *experimental corroboration*—as in the case cited above, when the student placed ice on the top of the glass.

Pupils, however, seldom go to these lengths. If the hypothesis seems to satisfy all conditions lying around, they rest contented. Adams' boy, who tried the rule of three, got an answer that he could not understand, as he said "the book could look out for that."

It is, therefore, the pleasant task of the teacher to bring up objections which lie within the experience of the pupils, for if the investigation is worth while to the pupil the objection will set him to work again. And pupils should be encouraged to take the initiative in searching for reasonable objections.

Verification and Problems.—One of the best ways of making pupils think is to have them verify their results. This is, again, the value of Spencer's "natural consequences" idea. In the commission problem on p. 177, above, the pupils carried out their method to the end and found it to be absurd. The check for arithmetic problems makes the pupils go over the work again with care. Let practice teachers try out their principles upon live pupils and they begin for the first time to understand the problems and methods of teaching. Wild guessing by an erratic pupil is steadied by requiring him to carry out his guesses to verify them.

Appreciation.—At this point, the control of the value now being completed, appreciation enters. When an operation of importance is completed and found to be satisfactory by all the tests, experience stops and *appreciates.* If it is satisfactory we go back over it, perhaps, but certainly we enjoy it actively. The pupils should, likewise, be encouraged in subtle ways to dwell upon a good piece of work for a while. It is an excellent thing to talk it over a bit, with little fear of making egotists out of them; for the next minute they will be running into some difficulty that will steady them.

Data.—In all this process of reasoning data have been assumed. Everybody comes to a problem with all his past experience. He also has certain factors in the situation itself, which, taken together, is all he has at hand to help him make his guess.

Now, some people have had much relevant experience when they approach a particular problem; others have little. In the mathematical examples, so frequently referred to, the pupils have a good deal of definite relevant experience and data. In the case of the tomato pests the amateur had little data, but the expert had much. The parents of the crying baby had very little definite information. Adams' boys had little that they could apply. Dewey's student was pretty well trained. Goodyear had very little at the beginning, but this steadily grew. It is impossible for any person to write down or state all the possible data he has at hand.

Summary.—For the control of values we have systems of instincts and reflexes, habits, ideas, facts and principles, ideals, prejudices, tastes and attitudes. These are acquired (except the first two) in response to needs and as the solution of problems. In this process of solution the problem is located, data moved into the field of action, guesses made at solution, and eliminated or accepted after verification. In this way the mind works normally and in this way the pupil should be taught.

Series of Problems.—One important fact should be brought out, in conclusion. There is not merely one problem in a situation; there are hundreds. One follows the other till the whole is completed. Two illustrations will make this clear. The first is quoted from a student's paper and analyzes a problem met outside school. The main problem was, "How to establish a church which we and other children would truly like to attend?" The following series arose:

(1) "Were other children interested in this? How could we interest the children of our own neighborhood in it? We found that several of them were, that a number of them would come out of curiosity, that a number of them did not like to go to church with the grown-ups, and for one reason or another some ten or twelve promised to come at first.

(2) "Where and when should we hold services? We interested our parents, and my mother donated a back room upstairs, on the condition that we should fix it up. We would hold services Sunday morning, as that seemed to be the most convenient time.

(3) "What sort of music should we have? We purchased an old organ from the parents of one of the children.

How should we pay for it? After careful thought we solved this problem by giving several magic lantern shows at our house, charging a penny admission.

(4) "Who should be preacher? My brother seemed most fitted on account of his earnestness, his interest, and his being some two years older than the rest of us.

(5) "Who should be choir and who congregation? A very serious problem. It was decided to alternate, each half should be choir one Sunday and congregation the next.

(6) "Where should we get our seats? The problem of constructing some rough wooden ones arose, but instead we obtained some straight chairs (each one obtained his own seat) and at our house we provided a few for the visitors.

(7) "Problem of constructing a platform for the minister. Each of us helped. Minor problems arose here, such as joining the boards together, width of platform, carpeting, etc.

(8) "Problem of choosing officers of the church, treasurer, ushers, etc. This was solved by appointing a committee who should select them.

(9) "Further problems of maintaining interest in the church, learning to pray 'in public,' of learning hymns, etc., were disposed of in similar ways."

In school, likewise, the same process occurs. We find it in such a simple problem in arithmetic as the following: Find the cost of 12 dozen oranges at 50 cents a dozen. The following problems arise: (1) What is to be found? Cost of 12 dozen oranges. (2) What is given? (a) 12 dozen; (b) 50 cents a dozen. (3) How find the cost? Multiply 12 by 50 cents. (4) How do this? From multiplication fact, $12 \times 50 = 600$, cost is $6.00. Again, in history, De Garmo says,[1] "For instance, in the case of the

[1] *Processes of Instruction*, p. 82.

frontier the main problem before the class would be to determine *the influence of the frontier in American History*. About this problem will cluster the gathering of historical facts, the influences that have a causal power, and the various channels through which these causes produce their diverse effects. In other words, the main problem will break up into a number of subsidiary ones, as, for example, what influence had the trapper's frontier upon that of the rancher? What modifying influences had the settlements immediately beyond the 'fall line' upon those below it? How did the frontier regions control legislation for internal improvements? for the distribution of the public domain? for protection to new industries, etc.?"

Here, again, the teacher may help materially by having the children *stop* and think. To repeat, one great danger is that the teacher is likely to make the steps so easy and so much alike that the pupil is busy all the time solving little problems and is never brought face to face with those that would baffle him for the time being. It is, of course, just as disastrous never to help him. The only point insisted upon here is that he be left to think for himself for a while, and *then*, when he cannot discover the difficulty or find an hypothesis, a hint may be given.

References for Class Reading

Creighton, *An Introductory Logic*, pp. 230-240.

De Garmo, *Principles of Secondary Education*, Vol. II pp. 28-32.

Dewey, *How We Think*, pp. 68-78.

Earhart, *Teaching Children to Study*, pp. 26-36.

Miller, *Psychology of Thinking*, pp. 260-267.

Scott, *Social Education*, pp. 102-130, 185-193, and others.

Exercises

1. Make a list of ideals and show how each affects conduct.

2. Of what use is knowledge? What is the fallacy in teaching it as an end in itself? Find references to this in earlier chapters.

3. To what extent is it true that we see only what we want to see? Why is it hard to believe good of an enemy, or to recognize that adverse decisions of an umpire are fair?

4. Name ten good prejudices. Justify each.

5. Give five examples of the deficiency of problems in school work; five from out of school life.

6. Give five cases in which you have made several hypotheses before reaching the solution of a problem.

7. It is objected that children will waste time if allowed to experiment on problems, and that the year's work cannot be covered. What are your answers to this objection, if you have any?

8. Can Scott's examples be applied to regular school work? Explain your answer in detail.

9. Give five examples of the use of verification in each of the following: writing, geography, spelling, history, physiology, and drawing. Select individual cases from your own experience as teacher or as pupil.

10. Select a complex problem in school work and show how it breaks up into a series of problems before it is all solved.

11. Give five cases of where pupils have not verified correctly, and of where the teacher might then have driven them into a corner by bringing out the weakness in their process of verification.

12. Collect data and tabulate them for the solution of this problem: Which of the phases, problem, data, hypothesis and verification comes first? Can you give them any definite order? Illustrate.

CHAPTER XIII

PSYCHOLOGICAL AND LOGICAL ORGANIZATION

Section 1. Introductory

In the last chapter we analyzed the process of reaching the solution of a problem.

In many of the examples it was clear that many steps were taken which would be unnecessary the next time the solution was sought. Goodyear tried many plans before he found the right one, and, after finding it, he spent much time perfecting it. Now, when people make vulcanized rubber they use his perfected plan, not his various attempts. Probably the average rubber goods manufacturer does not know about these earlier attempts. When tomato bugs worry again it will not be necessary to think of poison or ask the neighbors. The amateur will go out to the garden and knock them off with a paddle.

These first tortuous, uncertain gropings may be called "psychological," for want of a better term. The later perfected and polished organization may be appropriately called "logical," meaning by that a perfected structure.

For some years the psychological point of view has been vigorously seeking a foothold and has demonstrated its usefulness in a number of ways. A few of these will be taken up in this chapter and the next.

Section 2. The Daily Lesson

In an earlier chapter the structure of subject-matter was discussed, and at that time it was pointed out that the structure should be logically arranged and in such a way as to fulfill its function. At this point the relation of the logical to the psychological order of the subject-matter may be discussed in connection with the question,—Should the recitation follow, point by point, the logical outline of the day's lesson (the structure)?

It is, of course, impossible to lay down a definite rule. But if the logical outline is followed closely there is little opportunity for any original thinking by the pupil. For if it be true that the adult who first created the outline did so after experimentation, it is evident that a child could not construct it without a similar tortuous method. And hence, if the child is to be allowed the chance to think it out for himself, we need not be surprised if the logical outline is not followed.[1]

Illustration.—The following lesson was organized and taught to a class of second year students in the high school, in order to get a concrete illustration of the fact that in developing a lesson, fairly well organized from the logical standpoint, a teacher may not follow the logical outline step by step, if the pupils are allowed a reasonable amount of initiative and self-direction in attacking the problem. This particular subject-matter is composed of a number of topics which are more or less disconnected, and do not each grow out of the preceding.

It was taught at the beginning of a study of English history in order that the students might become acquainted with the geographical conditions of the British Isles, and might get some idea of their outstanding local and international characteristics. The subject-matter to be taught

[1] For an excellent philosophical discussion of this whole matter, the reader is referred to Dewey, *The Child and the Curriculum*, University of Chicago Press.

was organized by the teacher in the following relatively loose way.

Function of subject-matter is to solve the following problem: What is the relation between the geographical conditions and the navy, industries, wealth, cities, and national life of the British Isles?

Structure of subject-matter. The solution is made up of the following contributions: —

I. Geographical conditions:
  1. Islands (isolated from mainland),—
    a. in size 120,000 sq. mi. = (Missouri and Arkansas).
    b. in population 40 million = (Missouri and Arkansas, + 35 million).
    c. many excellent harbors on coast line.
  2. Mountainous in parts and level in parts.
  3. Great deposits of iron and coal close together.

II. Items affected by geographical conditions:
  1. Navy largest in the world—kept as large as any two others, necessary for protection,—
    a. from invasion—I, 1.
    b. from starvation—I, 1, a, and b.
    c. for shipping—I, 1, c, and II, 2, c, and d.
  2. Industries,—
    a. fishing—I, 1.
    b. agriculture (small for dense population)—I, 2.
    c. shipping (greatest in the world)—I, 1, c, and II, 2, d.
    d. manufacturing (second in quantity only to the United States) great because of shipping facilities, low wages, free trade, and skilled workmen, cheap fuel.—I, 1, a, and I, 3.
  3. Wealth greatest per capita in the world. Money invested all over the world—II, 2, c, and d.

4. Cities—I, 1, c. In England, London and Liverpool; in Scotland, Glasgow and Edinburgh; in Ireland, Belfast and Dublin.
5. Nationalities—a. Wales, because of mountains.
   b. Scotland, Lowlands of English origin. Highlands different because of mountains.
   c. England.
   d. Ireland, because of being an island.

The following report was given by the teacher: "I kept the outline in mind, but proceeded to let the pupils attack the problem in whatever way occurred to them. After a short conversation about the study of English history and its value for American people, I unrolled the map, and after they had looked at it for a moment gave them the direct problem, 'What are the things that make the history of one nation different from that of another?' I expected to receive two replies, 'The people of the nation,' and 'The geographical conditions.' The pupils gave the second one first, and that being the point I was after, I let the other go. I had them illustrate this from any source they could, and they spoke of Spain when discovering America, of Greece, and of China, while I suggested Switzerland. I immediately followed with another problem, 'What are the geographical conditions of the British Isles that have affected its history?' I expected to receive the reply, 'Its being an island and isolated from the mainland,' but from the previous discussion, and I presume from its configuration as shown on the map, one boy said, 'Its good harbors.' This required a pointing out of the harbors and, in connection with them,

Note.—The numbers after the points in II indicate those points in I which have an influence upon them.

of the chief cities of the two islands, London, Liverpool, Glasgow, and Belfast, to which I added Edinburgh and Dublin, the capitals of Scotland and Ireland, because of their future usefulness. This brought up, by some small intervening steps, the question of shipping, as implied in the idea of good harbors, and I gave them a number of facts about the importance of the shipping of England. This line of attack was now exhausted for the purpose of recitation.

"Then I returned to the original problem, 'What other geographical conditions affect the history of the British Isles?' The answer was, 'The mountains,' and we proceeded to point out that the islands were level in part and mountainous in part. When asked how this affected the history, they saw by lines that were drawn that the mountains in the west of Great Britain were coterminous with the Welsh nation, and that the mountains in the north were the home of the Highland Scotch, while the level land was populated by the English and Lowland Scotch. It was pointed out that the Cheviot Hills mark a political barrier, although the Lowlanders of Scotland are of the same origin as the people of England. Then, to bring in the Irish nation, I asked, 'What part of the British Isles remains unaccounted for?' whereupon they mentioned Ireland, and explained in terms of the geographical conditions that it is an isolated island. At this point I thought it wise to show them the size of England in terms of Missouri and Arkansas, and to compare the population of these two areas in order to show the density of population of the British Isles. This led me to ask the question, 'How do these people live?' and they replied from general information, 'By manufacturing.' Then I asked, 'Where do they get their fuel?' and we discussed the extent of the coal deposits of England. When the question of raw materials arose, the fact was brought out that there is much iron in England but that the bulk of raw materials is brought from other countries. This re-emphasized the question of the shipping industry. I repeated the question, 'What other industries have they?' and the students suggested agriculture; but they were of the opinion that since England is so small and the population so great, they would be unable to feed themselves, and would therefore be dependent upon other nations, and liable to hard times or even starvation in war.

"For the moment I forgot the industry of fishing, and returned to the original problem, 'What other geographical conditions would affect its history?' We had secured by direct questions the geographical facts that the islands have excellent harbors and that they are mountainous in parts and level in parts; we had secured, in following out these two lines, the geographical facts of its size and density of population, and of its deposits of iron and coal. The final fact that it is an island and isolated from the mainland, which I supposed they would give first, they had some difficulty in seeing, probably because it was so obvious, so I had to call their attention to it directly. This was done by the question, 'What advantage is it to England that it is insular?' and they replied that other nations could not invade it. I pointed out the flaw in this statement; viz., that other nations might invade it by the simple expedient of getting ships, whereupon they said that England would not be invaded if she had a navy large enough. We talked about the size of the navy, and when I asked the advantage of a large navy to England they were able to bring together from the tangle of our discussion up to date the three facts as given in the outline.

"At this point the reader will notice, by checking up with the outline, that we had covered all the items we had intended to take up, except those relating to fishing and the wealth of England.

"If the lesson had been left at this point the work would have been covered, because we had seen the relationship between the different items and the geographical conditions. But, while covered, it would have been in a relatively unusable shape because not properly organized. And so our next problem was that of logical organization. We did this by two *summaries*. First, we made a list of the geographical condition, and of the *mere* facts concerning the navy, industries, etc. In this summary we brought in the industry of fishing, which had been previously left out, as noted above, but did not bring in the facts concerning the wealth of the country, because, after all, it was related more directly to the industries than to the geographical conditions. In the second summary we took each item contained in division II and related it to the geographical conditions in division I, by the following type of question, which I had the students frame: 'What geographical conditions affect the nationalities of the British Isles?' 'What conditions affect the navy?' etc. It will be seen that this summary not only related the items of division II to the geographical conditions, but related them to one another.

"As a home assignment, the students were asked to synopsize the facts as given, in their logical order; and the worth of their work was gauged by their approximation to the logical outline as given in the preceding pages, which the students had not seen. I had intended to ask the following questions, which related to the problems of American conditions, but because of lack of time could not do it in that recitation: 1. Do these facts throw any light upon the reason why the United States thinks it requires a navy?

2. Might we expect the United States to divide itself into a group of separate nations because of geographical conditions? 3. If free trade is good for England, is the United States wise in having a high tariff?"

Suggestions. — The following observations might be made upon this lesson as typical of the teaching of a unit composed of a problem whose solution consists of a number of relatively discrete facts.

(1) If the pupils are given the maximum of liberty in their attack upon a problem, the development of the solution is not likely to follow either the logical outline or the order which the teacher has thought probable, no matter how extended his experience. He cannot foresee what point the students will attack first. By reference to the logical outline it will be seen that the order in which the points were taken up were these: harbors, cities, shipping, mountains, nationalities, size and population, manufacturing, shipping, other industries, agriculture, island as isolated from mainland, and navy. If the recitation had followed the logical outline it would have been a serious loss to the amount of actual thinking, experimenting, and relating that the students were able to put into the lesson.

(2) For the subject-matter to have its maximum value the recitation cannot be considered complete without a summary *in which every part of the structure is related to its function.*

(3) When the student is given the maximum of liberty of attack, the recitation is broken up into a series of problems and each step of the series grows out of the preceding. It will be noted that this recitation returned to the original problem three times, giving three groups of problems.

(4) The logical outline of the subject-matter is valuable for the teacher to use (a) as a standard of solution of the

main problem, and (b) to keep him from going too far afield in the recitation. He is held unconsciously or consciously to the main content of the solution.

(5) In a recitation, no matter how well such discrete subject-matter may be prepared and memorized by the teacher, frequently one part is omitted in the development under the stress of changing points of emphasis.

(6) In the summary the teacher is justified, while gathering up the subject-matter into a logical organization, in filling out those points which have been inadvertently omitted.

(7) In short, if the pupil is to have the maximum of liberty, the teacher must be extremely careful not to demand in the development the following of a cut-and-dried order of solution. That is secured later in the lesson by means of the summary.

In view of the fact that the teacher who does not follow his logical outline in a cut-and-dried way cannot foresee what order of points the pupils will take, of what should his planning consist? It seems that the best method of procedure for the teacher in preparing the development is to think over all possible difficulties that may arise in the children's getting hold of the subject-matter, and plan out how these will be made clear to them. By doing this he will, of course, be compelled to work out many difficulties that will never occur, but he will be able to cope with all that do occur. Nor is this an amount of preparation in which the teacher exceeds that of other professional men. One of the greatest lawyers of the country attributes his success to the fact that when studying a case he always worked out all the possible lines of objection so fully that over sixty per cent. of his material was never used. But the plan safeguarded him against failure and assured his success.

So, likewise, the teacher must anticipate all the difficulties, and may, also, work out a probable plan of how the lesson should proceed. This has advantages, especially for a novice; he is not entirely at sea; he has *some* plan to follow. But the teacher should not feel that he must follow this, whether occasion warrants or not. The plan should be fluent and easily suited to his pupils' convenience and best work.

The Summary.—The logical organization is arrived at in the summary. This is always the point at which the pupil is asked to state the main points discussed. It occurs whenever the development has gone far enough to make it desirable. And it is advisable to make it whenever the children have covered so much material that there is danger of their forgetting. Sometimes one will have summaries at a half dozen points in a recitation, sometimes only at the end. The summary should be made by the pupils unless the lesson has been a very difficult one. In the lesson preceding, the summary was not made till the end.

Section 3. Specific Subjects

In presenting the facts in any subject, the problem emerges again. Should the pupil take them up in their logical order, or in their psychological order?[1]

In those subjects in which a good deal of incidental study has already occurred, the logical order may be followed. Such is, for instance, the case with history or grammar in the eighth grade. But in those subjects which are relatively

[1] F. Burk, *Genetic vs. Logical Order in Drawing,* Ped. Sem., III, 296-323.

new to the pupils, new both as to principles and terminology, the psychological approach can be made with advantage. Two or three illustrations will make this clear.

Primary Reading. — In primary reading, the logical order is letters, syllables, words, and sentences. But it has been proved beyond the shadow of a doubt that the psychological point of approach is through the word, or, better still, through the sentence. Sentences, words, letters, syllables, is the order of strongest motivation, but this is not the logical order.

Geography.—Again, in studying climate in physical geography, the logical order as laid down in one text is the following: (1) The earth as a Planet. (2) The Atmosphere. (3) Distribution of Temperature. (4) General Circulation of the Atmosphere. (5) Storms. (6) The Moisture of the Atmosphere. (7) Weather and Climate. The teacher may, however, vary this order as follows:

A. (1) What makes wind blow? This leads to a discussion of temperature and pressure, and the study of the thermometer and barometer.

(2) What is the prevailing direction of the wind in Columbia? This leads to charting weather reports.

(3) Why does it blow in these directions? This introduces cyclones, highs and lows, and their size, area, track, etc. This shows that the wind is chiefly from the southwest, and south and west, because the track of the cyclones is north of Columbia, and moves from west to east.

(4) Where else can we find the directions of wind determined by temperature and pressure? This leads to the study of planetary winds.

(5) Why do these winds blow in these directions? This introduces the earth as a planet.

B. (1) From which directions do the rains usually come in Columbia? This to be determined by charts.

(2) Why? This leads to a study of the cause of rain, and the source of moisture.

(3) What is the cause of other weather phenomena, such as snow, hail, frost, etc.?

It may be stated that when worked out in detail these problems embrace about three-fourths of the text, though the order of topics in the text was not followed. Each problem has those topics in the text which bear upon it assigned for reading in connection with it. Then, after this amount of the text has been covered in this desultory way, the class may be turned to the first chapter, to go through all the chapters, one after the other, for the logical arrangement.

The advantages of this plan are, *first,* that a stronger motive is engendered, since both the love of geography and the interest in practical home problems are appealed to. *Second,* when the pupils take up the text in a logical way they go over relatively familiar material with a rich, recent content gained by the earlier survey. This method is of value in the introduction to many of the new subjects of the high school, such as physics, chemistry, biology, etc.

The principle of the psychological organization may be illustrated in another way, by means of the facts of the growth of subject-matter.

Section 4. Growth of Subject-Matter

From the time of Rousseau to the present there has been a constant use in pedagogy of the term "development and growth of the individual." Froebel and the Herbartians used it, and every teacher who has read even a minimum of pedagogical literature is acquainted with the idea.

The idea of growth has not, however, been applied with sufficient emphasis to the different kinds of subject-matter within experience. We speak of the development of the individual, but we do not think as often as we should about the development of each of the subjects within the individual. If such application is made of the term to branches of subject-matter, an interesting and valuable standpoint is obtained.

The Capital of the Child.—In the *first* place, just as the individual enters the business world with a certain capital, so he begins the study of *any* subject with a certain capital of that particular sort. For example, when he begins the study of formal history he has already within his experience a considerable mass of historical subject-matter. If a teacher could take the pains to discover the actual working capital that a pupil possesses, the mass would be found to be rather large. Or, again, we may instance the subject of formal grammar, if it is studied in the higher grades. The pupil probably has everything to start with except the terminology, although this capital is in a very inchoate, incorrect, and indefinite condition. Or, take the study of physics in the high school. The student starts with many notions concerning the relation of force to things that he sees about him. These notions are inexact and indefinite, both in meaning and in terminology. But the point is that he has them, and, moreover, that they are his capital, and that in the face of new situations he has nothing but them with which to work.

Subject-Matter Not Hypodermically Injected.—That is to say, and this is the *second* point, the teacher cannot hypodermically inject new subject-matter into the pupil. The child is at the mercy of what he already knows. He can move forward only in so far as problems of development emerge within this capital that he has. If they do not arise within this subject-matter, the thing which the teacher thinks he is teaching slides off the child's experience like water off the proverbial duck's back. Each branch of subject-matter grows just as the individual grows, by the development of what he already has. This does not preclude the "introduction" of new material. It simply lays stress upon the fact that the idea introduced gets meaning for the child from whatever reorganizations of experience he makes in order to get control of it. The first time he sees a mountain it means to him no more than he can gain by reorganization of what he already has. In this sense we rather get him to reorganize his experience so that it will approximate to the racial organizations than put into him new subject-matter as we add potatoes to a bin.

Child Subject-Matter the Focal Point.—In the *third* place, the important factor for the teacher, the one which he should keep in mind, is not the logically arranged textbook, but the subject-matter within the experience of the pupil. It is almost an obsession with us who teach, to have the subject-matter we are about to present always in the focus of attention, rather than the subject-matter which the pupil already has. Yet if the subject-matter within the pupil grows only by means of problems arising one after another, it is very evident that the condition in which it is situated in his mind and organized within it may be very different from that which we have so nicely organized within our own minds. It is unfortunate that we cannot get as clear an image of what his problems are as we have of our own, and one deficiency of ours is that the problem of imaging the state of the subject-matter within him is not so seriously attacked by us as it should be. To be sure, the knowledge of his mental content cannot be attained to any complete degree; the value to be gained from attacking this problem is essentially that of securing the right attitude rather than that of securing any definite picture.

Historical Growth of Subject-Matter.—To emphasize the fact that subject-matter grows in the individual, we can point to the historical organization of subject-matter. We have on record the different types of problems and organizations of subject-matter in the various branches. A study of the history of mathematics shows us that the organizations of the problems which the race has had at different times are very decidedly different in form from our own, but that out of these, by gradual growth, has developed the modern subject-matter. And while it cannot be maintained that the child duplicates the race in the consecutive order of his problems and his resultant organization of subject-matter, a study of the history of different branches of knowledge will illustrate by analogy the fact that the immature child differs very materially and widely from the mature and well-trained teacher, just as the old type of problems and their solutions differ from those of modern times. If we could remember that the subject-matter within each individual developed genetically from very crude and simple subject-matter by means of problems which arise within experience, as well as we remember that subject-matter developed historically within the race from very crude beginnings by means of problems which arose within racial experience, we would see more clearly the necessity for intellectual sympathy with children. For example, the beginnings of history in little children arise from what happened yesterday, last week, grows to include facts about father, grandfather, George Washington, Cinderella, Old Mother Hubbard, Abraham Lincoln—a jumble of past events which cannot by any means be organized from a historical point of view as they then stand.

Exercises

1. Observe a good teacher teach a lesson, after securing from him a logical organization of the subject-matter he expects to teach. Note how he varies from this in taking it up with the class. Have him explain the variations you noticed.

2. Were the summaries sufficient in number and well placed?

3. What were the points of difficulty for pupils?

4. How were they handled?

5. What motives were present?

6. What advantages were there in not following the systematic outline?

7. How do you think the lesson could have been improved?

8. If you have taught, or are teaching, give an illustration of your own of the first question above.

9. Work out for class a series of questions that will test the pupils' knowledge of a subject to be studied during the next year. Have these criticised in class, and from all the members make a composite list. Then make arrangements to have this list given to the pupils for whom it was made. Tabulate the results.

10. What are the striking points that the test brings out?

11. Is it true that a pupil knows a great deal about a subject before he begins to study it?

CHAPTER XIV

INCIDENTAL AND SYSTEMATIC TREATMENT OF SUBJECT-MATTER

Section i. Logically Organized Subject-Matter

The Common Plan.—The distinctions made in the last chapter have an unusually interesting application in the organization of the course of study, particularly in the elementary school.

For centuries the subjects of the course of study have been taught in isolation each from the other. Arithmetic is taught in one period, history in another, writing in a third, and so forth. Moreover, each subject has been arranged logically, as can be seen in any of the older school text-books. Grammar began with a definition of the subject, and a catalogue of its divisions, and then step by step the whole science was unfolded.

These two characteristics—logical arrangement and isolation—were the common characteristics of the treatment of all subjects up to a few years ago.

Weakness.—However, as pointed out by Herbart one hundred years ago, and particularly by Dewey in our own day, isolation of subjects is not natural. Children do not outside school have such strong lines of demarcation in what they do as is required by school practice. No child outside of school says this is arithmetic, that geography. He goes ahead with what he is doing and passes unconsciously from one subject to another.

It was pointed out by others that the presentation of subject-matter in logical order was not conducive to the greatest interest. Pestalozzi had made an improvement over earlier texts by insisting that there should, of course, be a logical sequence but that the steps should be easy. Pestalozzi, however, started from the wrong point of view. He should, instead of beginning with the simplest elements and proceeding by easy steps, have paid more attention to what children are interested in. Usually, for instance, it is easier and pleasanter for the pupil to begin with geography of the home vicinity than with the elements of geography. It is better in language to have him commence with a personal letter than with the rules of composition. In learning to write, they say, a child will do better by beginning with words than with the curves and lines that, when joined, give letters and, later, words.

Section 2. Psychologized Subject-Matter

Psychologized Subject-Matter.—The present generation of educators believe that there is much truth in these criticisms, and several attempts have been made to avoid isolation of subjects, and to make each subject correspond more nearly to the natural order or sequence of topics.

Perhaps no better illustration of the psychologizing of subject-matter in texts can be found than in the recent language and arithmetic texts. I select at random a language book and find the following to be the order of the language facts presented:

1. Definition of a sentence.
2. Capital at beginning of sentence.
3. Period at end of sentence.
4. Name of person begins with capital.
5. Use of "went" and "gone."
6. The paragraph.
7. Use of "a" and "an."

8. Use of capitals in a title.
9. Use of "run" and "ran."
10. Exclamations.
11. Capitals in names of places.
12. Use of "no," "not," "never" and "have."
13. Abbreviations.
14. Use of comma, etc.

Here it is observed that from a logical point of view the order is decidedly illogical. The author of the text claims that while it is not logical it takes up items that are of use in the written or spoken language of the pupils and presents them about in the order in which a need can be aroused for them. This is what is meant by psychologizing subject-matter.

The objection is raised that text-books can make only an imperfect attempt at this process because they do not fit the peculiar conditions of each class. It is claimed that they do not go the whole length and that the teacher who teaches the classes should determine the order of the topics, taking them up when needed. A complete psychologizing of a subject can be done only by a teacher with his own class. It would be better, say these critics, to have the subject-matter in language, for instance, arranged logically, with appropriate drill exercises for each topic, and let the teacher dip into it at any point where the errors each class make in their oral or written speech, demands. This is an excellent plan wherever well-trained teachers can be found. Where the teachers are poorly trained, a favorable outcome is not so certain.

Section 3. Correlation and Concentration

Correlation.—In the foregoing paragraphs we have been speaking of the psychological versus logical presentation of any subject. The other weakness of the commonly accepted division of subjects—isolation—has given rise to the doctrine of correlation. This goes back to Herbart and is amplified by his disciples. McMurry says,[1] "By correlation is meant such a connection between the parts of each study and such a spinning of relations and connecting links between different sciences that unity may spring out of the variety of knowledge. History, for example, is a series and collocation of facts explainable on the basis of cause and effect, a development. On the other hand, history is intimately related to geography, language, natural science, literature, and mathematics. It would be impossible to draw real history out by the roots without drawing all other studies out bodily with it."

Correlation attempts to relate the information in one subject with other subjects, different parts of the same subject with each other, and all subjects with the life of the pupil. Geography should be used in history. Attention should be paid to language in every other subject. Arithmetic should be used wherever needed. History should be used in literature. Facts found in Grecian history should be correlated at appropriate times with Roman history. The geography of Europe should be used in geography lessons on North America. Each day's lesson should be related with what has gone before.

Moreover, all school subjects should be related to the life of the child. Arithmetic should draw its applications from business life. The pupil should be able to draw up notes, receipts and bills. History should explain modern life and not be a mere study of ancient problems. Physiology should be related to sanitation and practical habits of hygiene. Civics should be studied in connection with the government of the home community.

[1] *Elements of General Method*, p. 162.

This is sound pedagogical doctrine. The school tends to make each subject an end in itself. But each subject is instrumental. It has been evolved by the race to control values, and children's values are largely practical.

Concentration.—In the search for motive and for a remedy for isolation, certain reformers have gone further, saying that there are two classes of correlated subjects—central and subordinate. They all agree pretty well that writing, spelling, reading, arithmetic, and language are subordinate subjects. The doctrine of concentration postulates that if certain subjects are made the central subjects; i. e., subjects which are studied continuously and more or less systematically, the subordinate subjects can be learned incidentally. It is not necessary to have a specific period for teaching writing or spelling every day. These can be better learned by having the children write upon the central subjects and study enough writing and spelling to do this properly. When pupils are found to write illegibly, then give some writing lessons. Gather up their errors in spelling and have a spelling lesson every once in a while.

It is claimed, and justly so, that two advantages will result. *First,* the pupils will have a stronger motive for learning material incidental to the work of the central subject, material for which they feel the need. *Second,* because they see its use they will understand it better. It will be concrete. When a boy is making a sled and has to measure his lumber he will get a stronger hold upon board measure and cost of lumber than if this were a hypothetical problem in an arithmetic class.

It is claimed by the opponents of concentration that the pupils will be better able to utilize the subject-matter of arithmetic, spelling or writing in the central subjects if they have *first* studied it systematically in separate classes.

This, of course, is true, but does not meet the question of motive. For if the subjects are each studied systematically and in isolation, how will the motive for each have been secured in the beginning? Presumably by immediate interest in the subject. But it is hard to get immediate interest in formal subjects such as writing or spelling, while it is relatively easy to secure interest in history or industrial work.

Section 4. Central Subjects

Central Subjects.—The selection of central subjects is dependent upon their immediate interest and their importance for pupils of the age at which they are studied. For if these central subjects do not possess value, no intrinsic need can be created for the instrumental subjects which are studied incidentally. The children will not care to learn arithmetic, spelling or writing if they have no interest in the subject-matter which requires the use of these. At the same time these central subjects must be studied, because they are of great use to the pupils at that time. Many trivial subjects possess interest, but they have to be excluded because they are not as important as something else.

Generally speaking, no one subject can be made the "core" because no one subject exercises the whole of life and no one can use all the incidental subjects. Literature is important and interesting, but it would not use much arithmetic or geography. Geography is important, but it will not use much literature or history. Consequently it is necessary to have more than one central subject in the whole course. These may be apportioned to different grades or run side by side through all the grades.

Which are the central subjects? To this several answers have been given by various people. These plans will be treated briefly and references will be given at the end of the chapter.

Parker's Plan.—F. W. Parker says,[1] "The subject-matter found in the child's environment, to be used in its development, is classified under the head of central subjects: (a) Geography, geology, and mineralogy—the sciences of inorganic matter. (b) Physics and chemistry—the laws of movement and change of inorganic matter. (c) Botany, zoology, anthropology, ethnology, and history—sciences of organic matter and life. (d) Physiology—the physics and chemistry of living organisms."

He adds: "A child comes in contact with all these subjects in its environment, and begins instinctively its investigations in each and every one of the directions indicated by the central subjects. The doctrine of concentration proposes that these subjects be continued as a child has begun them, until there arrives that period of mental development when a specialization of subjects can most economically grow out of the rich subsoil of the related knowledge of all subjects. The direct study of the central subjects, by observation, investigation, imagination, and original inference, furnishes an inexhaustible means of educative mental action."

It is to be borne in mind, of course, that these subjects are not to be studied in the grades with such attention to technical detail as the names of the subjects and acquaintance with them in college and high school would imply. Disciples of Parker have worked some of this out in detail as can be found in the early numbers of the journal now called the *Elementary School Teacher*.

Mrs. Alling-Aber's Plan.—Mrs. Alling-Aber describes an experiment carried on by her in Boston and repeated by

[1] *Talks on Pedagogics*, p. 377.

others in Chicago and states the aim[1] of the experiment as follows: "The aim of the experiment was to see if the child may not be introduced at once to the foundations of all learning—the natural and physical sciences, mathematics, literature (including language), and history—and at the same time be given a mastery of such elements of reading, writing, and number as usually constitute primary education."

This plan is obscure in this sense, that while mathematics is given as a central subject, arithmetic is studied incidentally as is shown later in her text (p. 171). This author adds literature to the list of central subjects quoted just above.

Dewey's Plan.—In *The School and Society* Professor Dewey gives a list of impulses and interests which may be counted upon in the grades.[2] These are the interest "in conversation or communication; in inquiry, or finding out things; in making things, or construction; and in artistic expression."

These are the impulses and interests. The material upon which they will work—the central subjects are fluent, but in so far as they were worked out in the Elementary School, chief emphasis was laid upon occupations as "the articulating centers of school life."[3]

Miss Dopp's Plan.—Miss Dopp has elaborated upon the plan just presented[4] for making occupations the center as follows:

1. In *later infancy* (2½ to 7 or 8 years) the child begins to exploit his environment. He will do this through

[1] *An Experiment in Education*, p. 3.

[2] P. 57.

[3] Op. cit., p. 24.

[4] *The Place of Industries in Education.*

games, dramatic plays, simple agricultural life before the introduction of machinery, contact with animals and plants, crude and simple construction work.

2. In the *period of transition* (eighth year) hunting activities, the earliest forms of trade, primitive travel and transportation by water, and the making of primitive tools and weapons may be made the center.

3. *Childhood* (8 to 10 years) is "pre-eminently a motor period." Such problems may be taken up as "how man secured dominion over the natural forces, substituting for the motive power of his own muscles that of the beast, the water, the wind, fire, steam, and electricity; and how, in applying these forces to the work of society, he invented tools, discovered mechanical principles, worked out metrical apparatus, exploited his environment in search of natural forces, and invented and controlled machines for the more advantageous application of these forces." (p. 158-9.)

Harriet M. Scott's Plan.—Miss Scott[1] has modified the *Culture Epoch* theory in applying it to American conditions and indicates, in a general way, the dominant interest for each grade, and the material which furnishes nutriment for the child at each stage of his development. These features may be exhibited in outline as follows:

DOMINANT INTEREST	MATERIAL
To use senses (curiosity).	Nomadic period of history—Indian as type.
For possessions.	Pastoral and agricultural period—early Aryan as type.
For attention or notice.	Persian.
To imitate (suggestibility).	Greek.

[1] *Organic Education*, pp. 28-30.

DOMINANT INTEREST	MATERIAL
To co-operate for the sake of gain.	Roman.
For personal freedom.	Early German.
To serve (display power).	Feudalism and chivalry.
For adventure, experiment.	Renaissance — Columbus as type.
For what is true (incipient).	Puritan as type of reformation.
For activity, movement, affairs.	Story of America.
For the practical.	United States in its organic relations.
For what is personally practical.	Europe and its relations to the United States.
For authoritative knowledge.	Asia (past, present, future) in relation to the United States.
For explanation—how things came to be, or how they are done.	Africa, as showing nations crystallized (interpreted through their works), and as showing nations in the making. Its meaning to the United States.
For approval (extremes shown in diffidence and egotism).	The earth's history as a planet, its present physical conditions, and the evolution of industrial life. (Each individual, though but a small part, is seen to be organically related to the whole.)

DOMINANT INTEREST	MATERIAL
For admiration and power.	Brief view of the history of the rise and decline of the great civilizations of the world (with causes), and special study of social life.
For a larger self-interest in community and national life.	Growth of the State as a larger self, as shown in United States history, and of the individual as a larger self, as shown in literature.
For the ideal.	Ideals of institutional life (particularly of the home), as shown through history, nature study, literature, and art.

She adds:[1] "The purpose of these headings may be briefly indicated, first on the negative side. They are not designed to be blindly followed by the teacher in her presentation of the period to the children. Their purpose is largely that of convenience, enabling the teacher to trace for herself the various lines of progress from age to age, and thus to gain a more distinct and orderly conception of each period in its specific relations to every other. The divisions may also serve to assure the teacher that she has omitted no essential points in either preparation or presentation, and to test the knowledge of the children in reviewing a given period. But it must not be supposed that, in the study of the Roman period, for instance, the teacher shall conscientiously complete the topic of, say, social

[1] Op. cit., p. 62.

life, before she allows herself to touch upon that of the church. In any of the earlier civilizations, especially, the different strands of life are so intertwined that to attempt to keep them rigidly apart is to do violence to the spirit of the age itself. In general, the order of topics set down may be followed, and whether followed or not it should always be clearly defined in the mind of the teacher; but only to clarify, not to dominate, the manner of presentation."

Meriam's Plan.—J. L. Meriam in a publication soon to be issued organizes the elementary school as follows:

In the first three grades four activities form the basis, these being the playing of games, handwork, observation, stories. In the fourth grade local industries form the center. These industries vary with the locality but include such common ones as the grocery store, the blacksmith shop, the shoe shop and the postoffice. In the fifth and sixth grades industries at large are the subjects of study: such industries as fishing, hunting, lumbering, mining, transportation, manufacturing, governmental activities, etc. In the seventh and eighth grades, in order to secure better interpretation and richer appreciation of these activities, their growth and evolution from simpler and cruder forms that have been or are now in use are studied.

Throughout all the grades the fourth activity of the primary grades—stories—is used, in the grades above the third it develops into the study of pictures, literature, and music. Likewise through all the grades from first to last attention is given to physical education largely through folk dances.

Stone's Plan.—C. W. Stone in his *Training School Course of Study,* finds "three interests, viz., *play, seasonal changes,* and *special days,* are available for use in each grade." "Beside the above mentioned interests that are utilized in all the grades, certain interests have been selected for special use in each individual grade. For the respective grades these are:

Grade I.	Home Life.
Grade II.	Community Occupations.
Grade III.	Community Industries.
Grade IV.	Helps from Other Lands. Transportation and Life in Other Lands.
Grade V.	Westward Expansion. The New World.
Grade VI.	Colonization and Our Heritage from Great Nations and Individuals.
Grade VII.	The Growth of Our Nation. The Growth of Our State.

Section 5. Incidental Subjects

To illustrate the manner in which the subjects may be introduced incidentally I shall quote freely from an unpublished experiment made by Ernest Horn in the University Elementary School, Columbia, Missouri, in 1908-9. The investigation was carried on in the seventh grade, and United States history was made the center. This means in terms of time periods, that history was studied all the day and every day in the year. And in studying history the pupils had to use writing, spelling, arithmetic, etc. There was no set period for these subjects. When it was necessary to study some arithmetic they stopped and studied it, sometimes for a few minutes, sometimes for a half day, depending upon the extent of the problem.

All of the reading of the year was based upon the history of the United States. With a few exceptions, such as foreign orations and Dickens' *American Notes,* all the selections read were from American authors. These selections were made for two purposes: *First,* for the descriptive matter they contained relative to the topic in hand, and *second,* for their worth as examples of the culture of the period in which they were produced. Oftentimes, as in the case of Franklin's *Autobiography* and Whittier's *Snowbound,* these two purposes became one.

Reading.—The method in reading orally was as follows: When information primarily was sought, either one member of the class prepared the reading and read to all the class, or the class read at sight, reading the paragraph or a page in turn. As the purpose stated above was to impart information, the attention in such reading was given to interpreting the printed page so clearly that the rest of the class could understand it. In case a pupil fell short of this criterion, the stanza or paragraph was reread by another member of the class. The reproof implied in this repetition was sufficient to insure better efforts next time. Occasionally the repetition was required of the pupil who failed to make himself understood the first time.

Literature.—Twenty-nine selections were read. They were selected for literary value and because they illustrated some event or period. Among the selections read were Aldrich's *Unguarded Gates,* Franklin's *Autobiography,* Lincoln's *Gettysburg Speech,* Lowell's *The Courting,* Woodworth's *The Old Oaken Bucket,* etc. In addition to this poetry, prose selections such as *Leather Stocking Tales, The Legend of Sleepy Hollow,* Dickens' *American Notes,* etc., were read.

Writing.—A great deal of written work was required in the course of the year's work (1) in the way of reports on special investigations, and (2) in making summaries or expositions of such solutions of the problems as had been found by the class. No work was accepted which was not done with care. The criterion was neatness and legibility. When a composition did not meet these requirements, the faults were pointed out and, after the necessary instruction as to how to correct the difficulties, the paper was rewritten.

Spelling.—In all written work the number of words misspelled on each page was marked at the top of that page. The words were not indicated but left to be sought out by the child. This was to give care in looking over work previous to handing it in. These words, when searched out, sometimes with the aid of a fellow-student, were written upon the back of the composition and handed to the teacher. A duplicate list was handed to the class secretary, who was elected every week, and he copied them in a notebook. After every misspelled word was written the initials of the pupil who had missed it. At the end of each week a spelling lesson was given upon the words missed. Words spelled incorrectly in this exercise were carried over until the next week. The system was thus self-corrective. At the end of the year the notebook in which the records were kept contained 639 different words, some of which had been misspelled very frequently. This does not represent the number, out of the total vocabulary used, that the children were unable to spell. Each child was taught to consult the dictionary for any word concerning the spelling of which he was in doubt. Many words, of course, which would otherwise have been misspelled, were for this reason spelled correctly. At the same time this list contains many simple words which were misspelled through a slip of the pen.

Grammar.—Attention to grammar arose from two sources: (1) in the interpretation of selections which were being read, and (2) in the correction of errors in written and oral composition. In the former case attention was directed to grammatical structure (1) when the meaning was not clear, or (2) when a closer analysis was helpful to a fuller appreciation of the selection.

Composition and Language.—There was no fixed order in which the forms of discourse or qualities of style were taught. Each paper depended for its form and content upon the problem being studied at the time. Its treatment might require any one or all of the forms of discourse. If the paper were not intelligible, nor interesting, that fact was noted by the class if read to them, or by the teacher if read by him. In reading papers the teacher indicated faults in the margin of the page on which they occurred, and discussed with the individual pupil the mistakes made by him. Whatever hindered the interest or clearness of a composition was corrected. Such corrections varied from punctuation to style. Where faults, as, for example, the lack of unity, were common to several pupils, time was taken in class for a correction of these faults. Considerable time was spent in discussing plans for composition, and there was gradually developed by the class the habit of carefully outlining a paper before writing it. Aside from such discussions as described above, no time was given for instruction in anything like rhetoric.

Arithmetic and Algebra.—In a solution of the problems which constituted the course of study much arithmetical work naturally arose. All work in arithmetic was done only to aid in the solution of some problem concerning the development of the United States. There were no drill problems except in cases where the pupil was unable to carry on the processes required. Usually such drill was needed by only part of the class. In such cases the other members of the class were free to continue their computations. Care was taken to see that the methods used were of the most economic kind. With the above exceptions every problem dealt with concrete material. Because of the estimates of large areas, populations, and wealth, many of the numbers used were very large. Care was taken to approach a relative understanding of such numbers by using graphic illustrations and comparisons in percentage.

Classified under the headings given in the ordinary text-books in arithmetic, a great variety of processes were used. It must be kept in mind that this list comprises only such computations as were found necessary to the solution of the problems arising in the history outlined in Chapter IV. No attempt was made to force a correlation in order to insure proficiency in any arithmetical process. The list of processes used follows:

(1) Addition, multiplication, subtraction, division. (2) Common fractions with very small denominators such as one-half, one-third, one-fourth, etc. (Fractions which necessitated the use of large denominators were always expressed in decimal form.) (3) Decimals, percentage, interest. (Study of the national bank, economics of slavery, etc.) (4) Taxes, a. Tariff (Jackson's administration); b. Direct (Revolutionary war, and Civil war); c. Income tax (Civil war); d. Internal revenue (Spanish-American war, Civil war). (5) Money, Foreign exchange, a. English (Estimates of Colonial industries); b. French (Louisiana Purchase). (6) Ratio, Comparisons. (7) Square measure (Public land policy, Railroad grants). (8) Cubical measure (Estimation of a ton as a measure of shipping capacity). (9) Linear measure. (10) Metric system. (11) Profit and loss (Protective tariff). (12) Square root (In getting more perfect ideas of areas by comparing them as to lengths and breadths). (13) Longitude and time (Knowledge of the world in 1492, Magellan's trip around the world).

These topics did not receive an equal amount of attention. Some did not occur frequently enough to give exercise in their processes equal to that given in the ordinary course of study. This is true of interest, cubical measure, square root, cube root, metric system, and common fractions with large denominator. On the other hand, the four fundamental processes, decimals, fractions, and percentage, were much more used than in the ordinary course of study. In the processes frequently used, an unusual degree of speed and accuracy was developed.

Geography.—A serious attempt was made to keep the geographic background of American History constantly in the minds of the pupils by frequent question (1) as to the location of places being discussed, and (2) as to the influence of physiography upon social, economic, and political conditions. A great deal of map-drawing was done to make these ideas, especially those of location, more exact.

Civics.—In the study of these problems practically all of the material given in the ordinary text-book in civics was used. Since, however, this knowledge was acquired in connection with governmental problems as they have arisen in the history of this country, a much better idea of the actual workings and purposes of the government was obtained than could have been obtained from the study of an elementary text-book in civics alone. Much care was taken to create by the study of admirable characters on the one hand, and of abhorrent ones on the other, a high standard of civic ideals.

Nature Study, Science, and Physiology.—Whenever a scientific principle or fact was needed in the solution of any problem, such a fact or principle was studied. Many experiments could not be performed on account of lack of laboratory facilities. While frequent reference was made to such scientific topics as are classified as science, only such topics can be given as received considerable study and laboratory methods. Such topics were as follows:

1. Compass. The north star. A chart of the great dipper and the north star was made from observation by the children at home.

2. Study of the principles of the water-wheel and the water turbine.

3. Study of the principle of the steam engine. An examination was made of a model of the steam engine in the engineering laboratory, University of Missouri. Telephone, telegraph.

4. Study of soils, reasons for cultivation, irrigation, fertilization.

5. Improvement of agriculture through scientific knowledge, illustrations from plant and animal breeding. The museum of the horticultural building furnished subject-matter for the study of plant breeding. The farm of the agricultural department furnished material for the study of animal breeding.

6. Farming implements and conveniences. Their improvement. Material for this study was obtained from the agricultural museum, University of Missouri.

7. Light. Reflection. Effect of sunlight as a sanitary agent.

8. Heat. Conduction. Radiation. Absorption. Modern fuels. The thermometer.

The study of physiology consisted almost entirely of the study of matters of hygiene. Such study arose from two sources: (1) in connection with the problems being discussed, and (2) in connection with the incidents of the schoolroom.

Physical Training.—Physical training was entirely separate from the study of United States history.

Drawing.—Drawings were made of such objects as could be obtained which had connection with problems outlined.

Systematization. — After considering Horn's experiment carefully, the question arises, Should certain of the subjects other than history have been studied systematically? Should not grammar be so studied? Or arithmetic?

The argument in favor is that if they are understood, they are remembered better, and if taken up systematically they are better understood. There seems undoubtedly to be a place for the incidental study of subjects and a very large place. The only question is, Should this study in the case of certain subjects be purely incidental?

A later systematization is of use for the sake of interest, understanding, and memory. There naturally is such a desire in the case of every one. But these systematic studies should come late. In the absence of statistics, opinions are allowable and by virtue of this liberty, I venture to state that if grammar is not studied systematically till the eighth grade, and arithmetic till the fourth grade, the pupils will know more about the subjects and will be able to use them better than if both are studied from the first grade up.

In deciding where the subjects should differentiate in the grades, we have no scientific data. It is all a matter of individual opinion. To obviate this, a careful study of the instincts and tendencies of school children at different ages should be made after a comprehensive plan.

The settled fact from all these experiments is this: Much correlation and incidental study of subjects can be carried on to great advantage. It is more difficult than to use the text-book straight, but it adds joyousness and interest to the teacher's work and keeps her young, because she is not getting into a rut.

References for Class Reading

Alling-Aber, *An Experiment in Education,* pp. 3-24.
Dewey, *The School and Society,* pp. 46-65.
Dopp, *The Place of Industries in Education,* pp. 104-172.
McMurry, *Elements of General Method,* pp. 162-179.
Parker, *Talks on Pedagogics,* pp. 25-46.
Scott, *Organic Education,* pp. 18-30 and 68 ff.

Exercises

1. Give several examples of the inability of pupils to apply to life facts learned in a subject in school.

2. How serious is the feeling that business men and other adults have on this subject?

3. How can this weakness be overcome?

4. Take a common text in arithmetic and note the order of the topics as is done in this chapter in the case of language. Do you think this is better or worse than a good logical treatment?

5. Give numerous instances of correlation between lessons in the same subject, between subjects, between subjects and the life of the pupils.

6. Make arithmetic a theoretical center and show what other subjects can be used incidentally. Do this for geography.

7. Which in your opinion is the best group of subjects as given by the different writers quoted? Give reasons.

8. To what extent could concentration be worked out in the high school? Give a theoretical plan, waiving the question of the wisdom of concentration.

9. In the preceding chapter an illustration was given in Section 3 from physical geography. Select a late text in a foreign language and show that that plan is followed. Does the method in the cases of the book examined increase

motive? Why, or why not, as the case may be? If not, how could you remedy the difficulty?

10. Is it necessary to have spelling lessons daily? In connection with this read Thorndike, *Principles of Teaching*, pp. 268-273, and state how it bears on the subject.

11. Illustrate in detail how children might learn arithmetic incidentally in the primary grades while having no systematic study of it.

12. Study a five-year-old boy and a five-year-old girl and determine how much arithmetic they have picked up incidentally before going to school? Is the amount larger or smaller than you thought?

CHAPTER XV

EXAMPLES OF METHODS OF SECURING MOTIVES

In this chapter we shall give typical illustrations of the securing of motive through problems and needs in both the systematic and incidental study of subjects.

For the sake of ready reference the method may be restated as follows: In order to raise a problem or arouse a need, it is necessary first that there be some value in the pupil's experience in whose control he is interested, second he must realize that he does not have adequate control of this, and then he will have a motive for studying new subject-matter. In this, it is necessary to distinguish between needs that arise from generic values (Chapter X) and those that arise from specific values (Chapter X). This is necessary because subject-matter is best learned when it is studied for its specific intrinsic function.

Section 1. Composition

If we take the subject of composition and apply this method we find that the value which it is created to control is the communication of values—and that it works best when the writer has something of value, an audience that knows less about the value than he and is at the same time interested in his value. The pupil is made to feel that he does not have control of this value; i. e., of communicating this value by the simple verifying process of trying his statement on his audience to see if they get his idea. If they do not (under the conditions of interest in his own idea) he will be anxious to study devices that will give him the desired effectiveness. At this point the various "forms" or rules of composition will be taken up as needed.

In this as in all cases he should be given an opportunity to solve the problem himself; i. e., remedy his defect. The teacher assists. And the methods used by good writers may be consulted to see how they do it.

Following is a report of work done in description in the University High School by Carter Alexander. In all cases the pupils were allowed to select their own topics. The audience (including pupils and teacher) listened to the composition read by the writers in class and decided upon the effectiveness of the work. In each case the teacher gave no preliminary lessons on a topic before it was developed in class. The pupils were told to write, and when their compositions were read flaws were found, and rules for correcting each were developed in class. Then they would write again and other flaws would be found and corrected.

Individual Subjects for Composition.— In order that the writer may have some value to express, of which the audience does not have control, the subjects of compositions may be chosen by the writer. If all write upon the same theme it follows, on the one hand, that the teacher cannot be sure that it is of value to the writers, and, on the other hand, one incentive to writing is taken away, because everybody is supposed to know as much about the topic as does the writer. Whether or not the topic be chosen by the writer, it must be a valuable one to him. In order to secure this, one rule may be laid down: let the writers choose a superlative experience—the *funniest,* the *most thrilling,* the *saddest,* or the *most peculiar.* The writer must also think of his audience, and select among his valuable experiences those which he believes will interest them.

A Genuine Audience.—In order to get an audience that will be below him in a knowledge of the thing he is to convey, the whole class should be the audience. He may feel that he cannot tell the teacher anything, but he is surer of the class. In addition to this the teacher should cultivate the attitude that makes the pupils feel that they *can* give him things which he does not already know. For undoubtedly they are often in a position to do so in connection with some matter of peculiar interest to them.

In such a situation it is only necessary to get the writer to feel that he cannot convey his meaning efficiently. In getting him to realize this and thereby feel the need for the forms of language, the audience, including the teacher, assists. It can decide upon his effectiveness as readers decide upon the effectiveness of a novelist. If they make him aware of the fact that he has not given them something worth while, he will be conscious that he has not accomplished his purpose.

With the need thus aroused the teacher sets to work with the class to devise a scheme for getting control of the process of communication. In almost every case the teacher can, by a "common sense method," get the children to state how to do it. And when they have found it they have struck upon the form or principle of language which the race has already worked out.

Report of a Series of Lessons.—The following is an example of how certain language forms used in description were taught: These forms were the fundamental image, point of view, details, choice of words, figures of speech, character description, and impressiveness.[1]

Description.—The class had been working upon nar-

[1] Taught by Carter Alexander in Teachers' College High School, University of Missouri.

ration and had found that whenever their narrative required descriptions the results were very unsatisfactory. So, with the weakness thus made evident, and their main problem—that of becoming efficient in writing descriptions—being clearly in mind, they turned to a study of description.

The first thing the teacher did was to have the class describe a thing without any directions except that they were to choose some one of six buildings on the campus, with the understanding that they were to make the picture clear enough for the others to see the thing described. These themes were read in class. The students criticized them on the basis of clearness of pictures. The audience felt that they could not get a clear image of some buildings, while they could of others, but that they did not see why this was so, except that the good themes seemed to follow some plan of description, and bad ones did not.

The General Outline.—The problem then became that of discovering what made certain themes good. The teacher helped in this by exposing a picture to them several times in order to show them how things are really seen. At the first exposure they got only an idea of the general outline, and at each succeeding exposure they were able to add details. In this way the students were able to formulate the statement that in description one should give a general idea to the audience first. They had thus arrived at the fundamental image. Then they went to Hawthorne to see how he handled the fundamental image. They next were asked to write themes in which they paid particular attention to this principle. These themes were read in class.

The Point of View.—The audience found that in describing a scene they had mentioned things that could not be seen from one standpoint; e. g., describing the outside and inside of a church in the same picture. Again they went to Hawthorne to see what he did with the standpoint, and found that he described from one point of view, or if he described from more than one he made the reader aware of the change. Then they wrote themes emphasizing the point of view and fundamental image.

Details.—During all the writing of descriptions the students had been worried about details, saying that they became confused about what to put in and what to leave out, and particularly in what order to place the items. This created a demand for a lesson on details. They discussed the matter themselves, and later consulted Hawthorne. Then other themes were written and read in class.

When these were read the audience brought out the fact that while some themes had a good point of view and handled details well, the impression was still flat and uninteresting.

Effectiveness.—The teacher then called up instances in which the students had used effective descriptive words and phrases, and said that they would study two methods of creating effectiveness, words and comparisons. Thereupon they went to Hawthorne again to see how he used these effectively. Again themes were written and read in class. The teacher once again set the problem, this time the study of comparison from a little different point of view; viz., figures of speech. Again they went to Hawthorne, and in addition studied some faulty figures in order by contrast to bring out the point that figures of speech should be used only when they made descriptions more effective, and that if a figure of speech attracted attention to itself it did not enhance the whole description. Then once more they wrote themes, and again read them in class.

Describing Persons.—Previously the students in writing themes had become conscious of their inability to describe people as well as scenes. The teacher referred to this and directed attention to description of people. They consulted Hawthorne to see his method and wrote themes in which they described teachers or pupils in the school but not in the class. They did this in order that the audience might have a chance to decide upon the truthfulness of the description. This proved intensely interesting.

Specific Impression. — In this lesson the audience observed that while some descriptions were impressive in parts, many of them did not have a central impression which they wished to convey. They then went to Hawthorne and to George Eliot to see if they had such, and how they seemed to secure it. They thereupon wrote themes in which they endeavored to convey specific impressions, such as the grandeur of Academic Hall, the disorder of a room, fear at night, pity, etc.

Conclusion.—This was all the time that the students were able to devote to description. They returned to the original narratives upon which they had failed, and rewrote them to make them more effective.

The teacher believes that in going over this course another time he would introduce the specific impression earlier, as a means of controlling details in the image, and as a means toward making the theme less flat and uninteresting.

This series of lessons seems to be particularly valuable as showing a method of so handling a course that the class itself will feel that their work is not satisfactory, that they will then take hold of the problem of making it more satisfactory, and that they will thereby feel the force and see the pertinence of the principles of composition.

Composition in the Grades.—It is possible and feasible to teach composition in the grades without a regular composition period. In doing this the teacher may correct common errors as they arise. For instance, in oral work the pupils may not be able to use *gone* and *went* or *saw* or *seen* correctly. When this is observed, the class may spend a few minutes studying this and may even have a home assignment upon it and the teacher will later catch up the errors when they occur again. In written work the teacher may observe errors and treat them similarly.

Whether a separate period is used for composition work or not the teacher should ascertain the commonest errors of all the pupils and use these as the basis for language study. Instances should be collected from their own speech and writing and particularly those in which they have been misunderstood because of incorrectness. There is a tremendous advantage in using the pupils' own errors. They have a keen interest in knowing and using the correct form. The teacher is saved much worry and expostulating. He takes the attitude: "Here is what you said; What are you going to do about it?" I remember very well one boy's saying under these conditions, "Why, Miss ———, *I* didn't say that, I *never* do." He was in a very teachable mood when the teacher showed him his written work containing the identical error.

It is stated in a previous chapter (p. 226) that the teacher can psychologize subject-matter effectively only when the peculiarities of each individual class are taken into account. The language text is of use as a handy drill exercise book in which the common errors can be arranged in systematic form, the teacher selecting the topics as they are needed in *his* class. To-day the rule studied may be on page 24, to-morrow on page 159, and the following day on page 47.

Application of Composition.—Incidental study of language should be carried on after, or while composition is being studied in a separate period. In high school work too little of this is done. What is required is that the teachers of the subjects other than English should insist upon as high standards of English as does the composition teacher. And time should be taken in a physics class to note common errors. If a pupil in physics is a serious offender because of negligence or poor training he should be put into a *hospital class in English composition* where he can receive special attention and assistance. Moreover, teachers of all subjects should report to the composition teachers the commonest errors they find, in order that this teacher may be guided in arranging and emphasizing his topics and treatment of the subject.

Section 2. Reading

Oral reading has a function similar to that of language, but differing in that the reader transmits to his audience the thing that he thinks valuable *expressed in the language of someone else.* But before he can read effectively he must make the value his own, and consequently in oral reading the situation is the same as in language.

The Motive in Oral Reading.—To build up the motive for reading the reader must feel that he has something worth reading with which his audience is unacquainted. Reading is likely to lack motive if everybody reads from the same book, and if each reader knows that everyone else knows as much about it as he does, probably more if he reads poorly. To obviate this, and to give a motive for reading, three devices may be mentioned: *First,* the pupils may be allowed regularly to bring to class clippings, jokes, short stories, sidelights on other lessons, etc., and read these. *Second,* the class may regularly be divided into two sections, and each section be allowed to have a different text-book. Then as each section reads, the other section constitutes an audience. *Third,* pupils in the study of other subjects, when exact information upon points of dispute or methods of procedure is lacking, may be allowed to turn to their books to find and read the sentences that will give the desired information.

How the Audience Helps.—To introduce the forms of good reading, such as enunciation, pronunciation, and carrying quality of the voice, it is only necessary to make the reader aware of his deficiencies by appealing to the audience. For instance, the other section of the class may report that they cannot hear the reader. Then he has a motive for learning to speak distinctly because he *wants* the audience to hear the fine story he is reading. Rules for speaking distinctly will be forthcoming from the teacher and the class.

Silent Reading.—In silent reading, where the pupil is reading to get the idea rather than to convey it to others, conditions are reversed. Here the author has the thing of value, and the reader does not have it but is interested in it. Motives for studying the forms of silent reading easily follow from analogy with the foregoing. And it should be borne in mind that the demand in life is for ability to read silently. Too little recognition is given to the need of training in the ability to get the thought.

"The best reading that the writer has ever heard in a third grade was done by children who read to each other. They used the readers in the school, and books from home and from the public library. Each child was permitted to make a selection and submit it to the teacher for approval. Then came the period of preparation, extending often over two or three days or even a week. During this time the child was supposed to study the selection carefully, learn the pronunciation of difficult words, and practice reading the selection so that he might give pleasure to those for whom the reading was done. The one good reason for reading aloud is to read to an audience who cares to hear what you have to offer. These children were participating in a social situation which demanded much of them, and they enjoyed the hard work which was necessary because the motive back of it all was genuine."[1]

Section 3. Writing

The Function of Writing.—Writing is an offshoot of language. It has the same general function—to communicate things of value to others who do not have them. Its specific function is to attend to the form of letters. Evidently the forms of letters should be drilled upon when the pupil sees that he cannot make his meaning clear because his writing is illegible. Legibility is the final standard. If he sees that something he wishes to say is misunderstood, or is understood with difficulty because he writes illegibly, he will have a motive for studying the writing forms.

A Motive for Practice.—The following device, which may be used from the sixth grade up, makes the writer conscious of his deficiencies and anxious to remedy them. Suppose we go on the assumption that a child whose writing is reasonably legible does not need to have special writing lessons. This is a fair assumption. Then make the writing period one in which *only* those who write their *composition, arithmetic, geography,* or *history* work illegibly shall receive special instruction, and as soon as the writing in these subjects becomes legible they will be excused from the writing class. This has several advantages. It raises the general tone of writing. It makes those who write illegibly

[1] Strayer, *Brief Course in Teaching Process,* pp. 133-4.

feel a need for writing legibly. Moreover, it provides that since only a few of the pupils, and these the poor writers, are in the class, the teacher can spend his time to better advantage in teaching them.

Section 4. History

In the chronological study of history the problem of the new unit usually can be made to rise out of the previous units. For if there is a central problem running through the whole period of history, each event is usually an attempt on the part of the nation to solve that problem which though in reality always the same, presents new phases, because some new factors come in to disturb the conditions already present.

This will be at once evident if we notice the arrangement of the following three lessons. We are to presuppose that the function of the subject-matter upon the Revolutionary Period is to show the relation of that period to the growth of the Union. Similarly, the function of each unit within the period must be to contribute to this main function. It will be observed in the lessons selected that the subject-matter is organized according to three main divisions: (1) The conditions giving rise to the event, which are subdivided into (a) old conditions and (b) new factors, and these, again, into subdivisions for and against union. The new factor raises the problem. (2) The event which results as an attempt to solve the problem. (3) The success of the solution (in terms of the main problem). This division has one advantage over the conventional division—cause, events, result—in that it focalizes the attention upon the problem aspect of history and tends to emphasize the continuous persistence of the problem studied.

Lesson I. Albany Conference, 1754.

A. Conditions giving rise to the conference.
  1. Old conditions.
    (a) Working against union—in general, local interests.
      (1) Religious differences—Catholics, Episcopalians, Puritans, and Baptists viewed each other with intolerance.
      (2) Political differences.
        i. Town government in the North, county in South, and mixed in Middle States.
        ii. Different classes of Colonies—royal, charter, and proprietary.
      (3) Social differences.
        i. Holders of large estates in the South, and small farmers in the North.
        ii. Cavalier ideals in South, Puritan ideals in North.
        iii. Wide differences in wealth and social position in South, small differences in North.
        iv. In South only industry agriculture, in North industries varied, both in and outside of the home.
        v. Lack of transportation facilities tended to emphasize isolation.
    (b) Working for union—necessity for defense against the French and Indians, for which purpose conferences were called, coalitions formed from time to time.
  2. New factor (giving rise to new form of problem)—serious nature of hostility between the colonies and the French and Indians immediately

preceding the French and Indian war, 1754-63.

B. Albany Conference, 1754. This came as a solution to the problem of defense, and was called at the request of the mother country.
  1. Franklin's plan—Colonies should combine for
    (a) Defense against incursions,
    (b) Regulation of Indian affairs,
    (c) Levying of taxes.
  2. Made treaty with Iroquois.

C. Success of Conference.
  1. Colonies, still afraid of loss of independence, looked with indifference upon proposals to combine (too much royal prerogative).
  2. British government indifferent because of danger of thereby revealing to the Colonies their own strength (too democratic).
  3. Brought the idea of union into the realm of practical politics.

LESSON II. THE SEVEN YEARS' WAR, 1756-63.

A. Conditions giving rise to the war.
  1. Old conditions.
    (a) English policy of territorial expansion.
    (b) French policy of territorial expansion.
  2. New factor—giving rise to problem.
    Coalition of England with Frederick the Great because of Hanoverian entanglements, and coalition of French with foes of Frederick—war between Frederick and his foes.

B. The Seven Years' war (solution of problem of supremacy—in America).
  1. Campaign against Duquesne—giving key to the West.

2. Campaign against Louisburg—giving naval control of the St. Lawrence.
3. Campaign against Quebec—giving control of Canada.

C. Success of the war (in terms of the main problem).
1. Union was facilitated by
(a) Active feeling of co-operation among Colonies,
(b) Consciousness of military strength.
2. Union was retarded by freedom from invasion.

Lesson III. Stamp Act Congress, 1765.

A. Conditions giving rise to the Stamp Act Congress.
1. Old conditions.
(a) Factors working for separation.
(1) As in Lesson I.
(2) Freedom from invasion (Lesson II).
(b) Factors working for union—as mentioned in C. 1 in Lesson II.
2. New factors—giving rise to problem.
(a) The mother country began to enforce the policy that the Colonies exist for the benefit of the mother country.
(1) Enforcement of Navigation Act, which led to
(2) Writs of Assistance, 1761, which were obnoxious because subversive of personal liberty.
(b) Parson's Clause, 1761, an unpopular assertion of the royal prerogative.
(c) Demands on the part of the mother country that the Colonies help to defray the expenses of the Seven Years' War.
(1) Difference of opinion—the mother country claimed that the war protected the Colonies, while the Colonies claimed that the war

was a part of the mother country's imperial policy.

(2) Stamp Act—the instrument by which the mother country sought to enforce the demand.

(3) Serious objection by the Colonies on the ground that there should not be taxation without representation (riots, formation of patriotic societies, etc.).

B. Stamp Act Congress, 1765 (an attempt to remedy the difficulty).

1. Drew up petitions to the king.
2. Made Declaration of Rights to parliament.

C. Success (in terms of the main problem).

1. Colonies act together again for a common purpose and upon their own initiative.
2. Colonies gained increasing consciousness of power (with repeal of Stamp Act).

Special Occasions.—In the lower grades history is studied incidentally and a good deal of history is learned in that way. Thanksgiving Day, other national holidays, birthdays of great men are made occasions for learning historical facts and studying historical material. These present events of great interest to pupils and create motives for the study of these disconnected stories. Moral errors often are cured by historical accounts of good men, and from these various sources the pupil, by the time he has reached the fourth grade, has quite a considerable fund of history.

Stories.—When history is begun in the fifth grade it is not feasible to have the connected treatment given in the foregoing part of this section. It is there at best a collection of rather disconnected narrative chiefly stories of great men and great events.

But in that case each story can be organized closely within itself. It can be gone into in such detail as to give the feel of the times. This is very well illustrated in the case of the Colonial period by Miss Dopp in *The Place of Industries in Education,* pp. 192 to 242. Here innumerable closely related problems grow out of the story. Until a whole field of history can be studied systematically the work of the grades up to that time should study typical periods systematically and in detail. Better a few topics in history made vital than many skimmed over for the superficial facts.

Present Problems as a Motive.—On many occasions present day problems and interests may give the motive for historical study. In high school the tariff, the negro, the Indian, the Panama Canal, arbitration, the Japanese war scare bug-a-boo, are often of such immediate interest as to lead to the investigation of their origin and history. In fact any intelligent understanding of the problems necessitates an historical study. Probably the first half year in high school history can with advantage be spent in an historical study of modern problems as an introduction to history which may then begin systematically with ancient history. Certainly modern problems and current events should run along parallel with every history course.

Section 5. Arithmetic

Arithmetic may be studied incidentally both before and after a systematic study has taken place. Systematic arithmetic should probably not begin before the fourth grade; for it seems clear that if it is begun in that grade the pupils will have a better hold upon it at the end of the seventh grade than if they began in the first grade.

If the subject is studied incidentally in the lower grades the pupils get what arithmetic they need. And because they need it they are likely to understand it better.

Incidental Work. — If arithmetic is taught incidentally it is an easy matter to secure motives for its study. For instance, in the game of "bean bag" in the primary grades, where the pupils try to throw four bags, say, through a hoop, a motive for addition may be secured. Each of the children may be allowed to put down in a separate column on the board the number of bags he throws through the hoop, thus giving practice in counting and making figures. After going three times around the class the following table might result:

Mary	Willie	John	Susie	Tom
3	4	2	3	1
2	3	1	4	3
3	3	3	2	4

Then the question will be asked, "Who is ahead?" Here is a strong motive for adding, for this question cannot be settled till the results are added.

Or, again, in the construction of a flower bed all sorts of arithmetic facts will be necessary before the bed is laid off, and each pupil given his proper share. Here also the motive is strong, and the study of the necessary arithmetic will be carried on with vigor.

Isolated Arithmetic.—But when arithmetic is taught as a separate study, and situations have to be found which will require the use of its principles in order to get control of the situations for which the race has constructed them, it is sometimes impossible to find practical situations such as can be found if it is taught incidentally, or such as we have cited in language, writing, and reading. Then the teacher has to fall back upon generic values, upon immediate interest, or upon imaginary situations. However, in all cases in which an appropriate imaginary situation can be devised it should be built up. A few examples may be given.

Carrying in Addition.—Some teachers teach carrying in addition by dramatizing bookkeeping. The children are bookkeepers for the Chicago Flagstaff Company. The staffs for shipping are done up in bundles of ten. Three dealers in Oskaloosa, Iowa, send in orders, one for one bundle and six separate staffs; one for two bundles and four separate ones; and the last for one bundle and five separate ones. They are all to be done up in bundles to be broken in Oskaloosa. How many bundles? The value here is to do the work of the "bookkeepers" and to order the bundling to be done. The carrying must be performed before this can be done.

Business Forms.—Again, by establishing a "bank" in the school and allowing the pupils to carry it on, at first, *without instruction,* it is possible to have them feel the need for written promissory notes, for receipts, or for checks. These will, then, be better understood, because the pupils are conscious of how things are going wrong when they are not used, and will "discover" them as means for keeping correct accounts.

Cancellation.—An example of a very good method of introducing the rules for testing for factors by sight is the following, which illustrates how a *practical* situation may be created when arithmetic is studied as a separate subject. Take, for instance, the rule of divisibility by three. We know that if the sum of the digits is divisible by three the number is divisible by three. The function is to give *rapidity* in cancellation. We may teach this by appealing to immediate interest, and state the aim, "Let us find a quick way of telling when a number is divisible by three." But it is more effective to arouse a need for it. This may be done as follows: The children are supposed to think that rapidity in cancellation is worth while. To bring this value actively into consciousness give a few exercises, such as $\frac{27}{54}$, $\frac{19}{57}$, $\frac{24}{36}$, working for rapidity. The teacher's next problem is to make the children see that they are not so rapid as they might be; that is, that they have not full control of the value. This may be done in a variety of ways. Perhaps a particularly difficult problem may be given, such as $\frac{729}{2181}$. While the children are laboring with it the teacher may work it out on the board, and then before they have finished may say, "I have already finished; you are slow," etc. And may explain further, "I didn't do it more rapidly because I am a better divider than you are. I have a short way." This will make them conscious of slowness, and will give them a stronger motive for learning the rule than does mere immediate interest. The time spent in securing a motive is well spent.

Section 6. Physics

There is probably no subject more capable of interested pursuit than is physics. The pupils are surrounded with levers, bridges, houses, door-bells, automobiles, eye-glasses, and thousands of other things whose inner workings are explained by physics.

But most physics text-books are so much concerned with giving a systematic and mathematical treatment of the subject that the pupils are overwhelmed and discouraged.

The teacher should do this: *First,* cut away from the order of the text, disregard the mathematical explanations that explain principles to the teacher but obscure them for the pupils. Take up objects such as those mentioned above and explain them. This would not be systematic, but it would be intelligible. Then, *second,* after covering the principles incidentally as suggested, the latter part of the course can be given to a systematic study of the text. Perhaps two months out of nine will be sufficient for this, and when the pupils come to it they will be able to understand what is being done.

References for Class Reading

Hall, *Adolescence,* Vol. II, Chap. 12.

Dopp, *Place of Industries in Elementary Education,* pp. 192-242.

Exercises

1. Work out method of securing motives in three consecutive lessons in the systematic study of geography, arithmetic, physiology, physics, zoology, botany, chemistry, drawing, woodworking, cooking, Latin, French, German, reading, or such of these as you are familiar with.

2. State the practical problems that might be used as a point of attack in studying the following subjects incidentally: civics, physiology through hygiene and sanitation, botany through agriculture, physics through its applications, chemistry through cooking, color through house decoration, physical geography, writing, music, and woodworking. Clothe these problems in as catchy language as is consonant with their true meaning.

CHAPTER XVI

FORMS OF INSTRUCTION

SECTION I. "TELLING"

Definition.—When the teacher "tells" pupils a fact or principle, what he does is to give them a *ready-made* method of control. For instance, when a child does not know how to make a certain stitch in sewing, the teacher may say to her, "I will show you how." In cooking, the teacher may explain and show the pupils how to cook starches. In painting, the pupils may be shown how to hold the brush and how to mix their paints. In arithmetic, the children may be shown the mechanical forms of solution, or they may be given the formula for the area of a circle. In writing, the forms of the letters are given, and in spelling, the order of the letters. In history, facts are told, descriptions given, pictures shown.

It is evident from a survey of a mass of methods of which these are types, that much has to be given to pupils ready made. [1]"It is clear that progress is rendered possible by the fact that we may assimilate and turn to our own use certain of the judgments that have been worked out by our predecessors. In this way we profit, not only by our own experience, but also by the experience of others. If this were not the case, each would have to repeat, step by step, the monotonous history of those who had preceded him, subject to the same sources of error and making all the

[1] Bagley, *Educative Process*, p. 257.

mistakes and blunders that they had made. But through the organization of experiences in judgment form, the mistakes are gradually eliminated. Each generation inherits from its predecessors innumerable systems of judgments which represent years, perhaps centuries, of selection and elimination. It is hardly too much to say that, for every fact and principle that survives, a thousand false judgments and erroneous principles have been eliminated. The former constitute our intellectual heritage; the latter have been forgotten."

Advantages of "Telling." — Ready-made methods of control have a large place and great value in education and life. When the feet are to be kept dry and warm, ready-made shoes are bought. When the house is to be lighted, we turn the switch. When our health is to be improved, we get some medicine from the doctor. When we wish to visit a friend, we make use of the electric car. When we wish to paint the house, we buy prepared paints. When a man desires to appease his hunger, he eats the foods prepared in the kitchen or restaurant. These are only a few of all the methods of control that we accept without necessarily understanding them.

Moreover, they are efficient in giving control, not always perfect control, but they give reasonable satisfaction. Ready-made shoes keep the feet warm and dry, electric lights illuminate the house, the doctor's medicine helps the patient, the electric car carries us to our destination, the prepared paint beautifies and preserves the house, and the cook's food appeases hunger.

"Telling" is also in some cases satisfactory. The reason for this is that we can *use* a method of control in securing what we desire even when the method is ready-made. The forms of letters which are prescribed by convention will convey our meanings better, perhaps, than any we could invent. The same is true of orthographic forms. Receipts in domestic science are usually more efficient than those made by pupils by experiment. The facts of history cannot be gained except upon authority.

Moreover, if we did not use ready-made methods at all we would be as helpless as the first man, more so, in fact, for he had his ready-made instincts and reflexes suited to his condition to fall back upon. So "telling" in its broader aspect keeps the children from being incompetent. Life is so short that if they do not accept these inheritances they will be able to make little advance, will, indeed, fall far behind the generation which bore them. The wild boys, who have been discovered, are object lessons in lack of control because of dependence upon their own efforts.

Section 2. Developing Subject-Matter

In a recitation where there are three factors—pupils, text-book, and teacher—the emphasis may be placed upon any one of the three.

Text-book Method.—If the emphasis is placed on the text-book while the teacher and the pupils follow it we have the text-book method of teaching. This is an old method of teaching, used until a few years ago almost entirely in the schools below the university. The use of this method implies that the lessons shall be assigned in the text, and usually it is recited as the text states it. In more recent times it is still used extensively, and in actual operation consists in the teacher making an assignment for home study in advance of today's lesson and in having the pupils recite upon it tomorrow.

An instance comes to mind in English history. The teacher had assigned ten pages in advance the night before

I visited the class. In the recitation which I observed all the pupils that could be accommodated at the board were arranged in order. There were six topics assigned the night before, so the pupils number from 1 to 6, and then the seventh called himself 1, the eighth, 2, in the ordinary way. All the 1s were asked to write on one topic, all the 2s upon another. After they had written they took their seats, and the teacher and the class went over each topic and picked out errors. This occupied the whole period. At the close of the period the next six or seven pages were assigned for next day.

The teacher considered his whole business to consist in seeing if the pupils remembered the facts in the lesson. No emphasis was placed upon anything the pupils did or wanted. They were looked upon as memory machines. Here we have chief emphasis upon the text-book. But pupils and teachers are factors in the recitation, though not considered to be so important as the text.

Lecture Method.—If the emphasis is placed upon the teacher, and the text and pupils are minimized, we have what is called the lecture method. This method is commoner in colleges than in other schools, though not so common as it was a few years ago. Pulpit sermons are also examples of the lecture method.

The chief difficulties with the lecture methods are these: The teacher does not know the problems of the pupils, and so cannot give them subject-matter in such a form as to solve their problems. Most of what the lecturer gives is not understood by the pupils, nor is any need for it felt.

There are, however, many cases in which a few minutes of connected discourse can be given with advantage by the teacher. When a topic has reached the point for a summary, when discussion has proceeded far enough, the teacher sometimes can sum up to advantage. This gives a logical arrangement as shown in Chapter XII. Elaboration by material which the pupil cannot secure for himself can be given in lecture form. But where lecturing is the only form of instruction, nobody but the teacher is working very much. And he often adopts the lecture form because it is easier for him than developing or using a text.

Here, again, the pupil is minimized. His business is to take in the important subject-matter, the lecture.

Developing Method.—If the emphasis is placed upon the pupil, and the text-book and teacher are viewed as instruments, in the proper functioning of his activity we have the developing method. In terms of control, the developing method may be described as a method by which the pupil works out his own methods and control with such assistance from teacher and text as is economical of time and effort. In terms of judgment, Bagley says this method places the pupil under conditions that will impel him to form judgments for himself.[1] The developing method leads the pupils to reason, the "telling" method to remember.

In terms of activity, McMurry says with this method "the minds of the pupils are *active* in producing thought," they ask questions, and in expressing thought use their own words rather than those of the book or the teacher.

Standard.—The test of a good development lesson is a maximum of intelligent effort with a minimum of assistance from text and teacher such as to produce the highest degree of efficiency. There are two extremes. On the one hand, there may be no assistance, only unaided effort on the part of the pupils. This is not efficient; it is wasteful. The pupils make too many costly errors. On the other hand, there may be so much assistance that the pupils do nothing.

[1] *Educative Process,* p. 256.

This is equally wasteful and inefficient. The developing method has the highest quality when just enough assistance is given pupils to enable them to do their work with the highest rate and degree of efficiency. Where this point of maximum efficiency lies has to be decided in each individual case.

Developing Solutions.—The developing method seeks to have the pupils do certain things as much for themselves as efficient use of time and effort will permit. It aims to have the pupil find his own problems for himself, to gather as much data as he can for himself—above all, to make his own hypothesis, and also to verify for himself. The whole process is thrown over on him. The text offers hints and suggestions for all of these, and the teacher is safeguarded against *fruitless* blundering.

From this it is evident that the developing method cannot be worked out in any certain way before the teacher goes to the class. For the trend of the teacher's directions and suggestions will be determined by what line the pupils take and by the kind of assistance they need.

Yet, at the same time, a teacher, like a general, should have a tentative plan of campaign worked out before entering upon the lesson; but it must be a plan subject to revision at a moment's notice.

Advantages of the Developing Plan.—In the *first* place, it assists the memory in retaining the method. This is true because there is a good deal of repetition, because it makes associations at every point of progress, and because attention is keen by virtue of the vigorous working of the mind.

In the *second* place, it enables the student to reconstruct the method when memory fails to recall it. If he begins with his old methods, by reorganizing them he may be able to reason the organization out again. To be sure, he may forget these also, but if he has once worked them out he is more advantageously situated for reconstructing the method than if he had merely accepted the method and had not constructed it.

In the *third* place, he has a better hold upon it when he uses it. He understands it better, and understands better the uses to which it may be put. The motorman who understands the mechanics of his car is better able to control it than he would be if he had been taught only the way to turn the lever. The scientist who has worked the theory of evolution through for himself will be better able to apply it to problems than will the one who has accepted the theory on authority. For, after all, problems of the same type are not all alike. They differ, at least a little, and when they differ the method has to be modified. If the student has constructed it, he then can see better how it may be changed, and by being changed become more effective. He *understands* it.

In the *fourth* place (in amplification of the last mentioned advantage), when the method is remembered but fails to work, he can modify it to apply to the special conditions. And herein lies the weakness of the ready-made method. If it is accepted ready-made and breaks down, the user is helpless. But if he understands its construction he can make it work again. For instance, when a coat does not fit, the customer may be helpless, but the maker can remedy the trouble. If the electric lights go out, the consumer is helpless, but the electrician can set them going again. If the medicine does not restore health, the patient can do nothing, but the doctor can re-examine the patient and compound other medicines that will be more likely to work. When the electric car stops, the passengers sit and wait, but the mechanic sets it going again. When the food does not satisfy, the cook is the one who can change the method of preparation. In all these cases, the one who understands the method of construction is best able to set things going when some part fails to work. And this ability gives one tremendous advantage in practical life.

In the *fifth* place, the *habit* of thinking things through, of trying and experimenting, is a good one to form. Nor is this to be discounted because of arguments against formal discipline. (For we have identity of procedure and of substance and ideals that do not need to be carried over.) If the developing plan is carried on in *every* subject, then, in so far as the subjects are germane to life, there will be with life the closest identity of both procedure and substance. And, if the ideal of *understanding* is realized in every subject there will be no necessity for carrying it over to other subjects.

Limitations of the Developing Method.—McMurry[1] gives three limitations. He says that not everything can be developed; *second,* that it is an extremely difficult method to follow; and, *third,* that the intellectual treasures of the past lie locked up in books.

Not everything can be developed, because, in the *first* place, many methods that the children can use ready-made are too difficult for them to construct. We have to tell them many things for which we cannot explain the reason. Excellent foods may be cooked without a knowledge of the chemistry of the foods to show why the ingredients act as they do. Historical events are sometimes told to children without the reasons for the events being made evident. In the *second* place, not everything that might be developed

[1] Op. cit., pp. 142-143.

ought to be developed. There is not time to do so. And even though it be true, as McMurry says, that nine-tenths of what is taken up in school is forgotten, it does not follow that only one-tenth of the school work should be covered, and that by the developing method. For undoubtedly some of the methods of control that are most useful are such that they cannot be developed.

That the developing method is extremely difficult to follow is undoubtedly true. If the test of efficiency were merely the asking of questions it would be an easy matter, but when the standard is that of giving the children the privilege of doing the experimenting, it is different. For questions may be merely the dress in which "telling" masquerades. Then, again, too many questions make the progress too easy and lead to puerile thinking. Efficient use of the method does not depend upon questions, but upon the character of the questions; upon whether or not they stimulate thought.

A fourth limitation which McMurry mentions in another connection, is that it is open to the danger of wandering. The reason for this is that the teacher has temporarily to forsake the exact order of logical organization, in order to follow the lead of the children. But if the problem is kept in mind, if the solution to be arrived at is clearly understood by the teacher, this danger will be obviated, in part at least. Then, too, the teacher may think out how he will develop the lesson, and may determine the "pivotal" questions, to use McMurry's phrase. To be sure, he may not follow this sequence, because the children may not give the answers he desires. But with increasing skill in teaching he will be able to foresee more accurately; and, at the worst, even if he has to discard his development plan, to have thought out *some* plan will be of assistance in making a new one when required.

Developing vs. "Telling."—What shall be developed, and what shall be given ready-made? We have no scientific data upon which to base a method of procedure. Any statement made must rest upon an empirical basis. It seems reasonable to say that those methods of control which will be the most useful and whose construction is within the power of the children, should be developed. All facts of temporary importance may be "told," unless very easy and capable of rapid development. All principles, no matter though they be important, if at the same time their basis is beyond the children's power, may be given ready-made, or delayed till they can be worked out. But all the methods (principles or facts) which *should* be in the possession of the pupils, because of frequent use or of fundamental importance, and which the pupils can construct for themselves, may, as just said above, be developed.

To take a simple illustration from geography: The geographical conditions that make a city great should be developed, but the size of the city must be told. The first is within the power of children, who are usually taught the facts; the second is not particularly important, and, of course, could not be developed, since it would necessitate a visit to the city and the counting of its inhabitants. And, again, the rules for division by fractions and for the extracting of the square root should not be developed in the eighth grade, the former because too difficult, though important, the latter because both too difficult and unimportant.

To avoid confusion, it may be said in concluding that both developing and "telling" usually occur in the same lesson. Some data are given by the teacher, some are collected by the pupils, some suggestions are made by the teacher and others by the pupils.

References for Class Reading

Bagley, *Educative Process*, pp. 256-264.
McMurry, *The Method of the Recitation*, pp. 118-146.

Exercises

1. Name ten things that you have found out for yourself during the last ten days.

2. Does it ever happen that you are better satisfied to have some person tell you something outright than to merely give you hints and hold back a full explanation? Illustrate.

3. Developing is used very little outside of school. People generally give you information outright when you ask for it. Is that a weakness?

4. Is a sequence of important facts a good sign of the use of the developing type? Why?

5. How can you have any developing of a topic if you use a text-book which explains the topic?

6. Why is it that a teacher never gets to know his pupils' needs when he lectures all the time?

7. Is it necessary or advisable in developing a solution to always grade the questions starting from easy ones and going to difficult?

8. How would you evaluate this teacher's statement?— I have never asked a question which my class could not answer.

9. Give two outstanding examples of cases in which you remembered a thing much better when you worked it out than when told you; two in which you understood the subject better under the same conditions.

10. If you are observing classes, note cases in which the development is poor, and state the reason.

11. Note in this observation cases in which a point should have been developed instead of being told, and one of the opposite sort in which an attempt at development might better have been omitted and the facts told.

CHAPTER XVII

TEXT-BOOKS

Section 1. Introductory

In the last chapter the text-book method was described briefly. This chapter will deal with the text-book more extensively and will endeavor to show that the text-book when used in a certain way is a legitimate part of the developing method. This is in opposition to McMurry, who says,[1] "Neither does she (in the developing method) allow the facts that are to be learned to be first presented through a text-book; she prefers to develop facts and conclusions by conversation with the pupils."

We shall endeavor to show that in some cases the text-book does not give an efficient amount of assistance, and in other cases does. In this latter case it belongs to the highest type of developmental work.

What Is a Text-book?—Briefly, a text-book is simply a vehicle for the transmission of solutions of problems. This is merely another case of the frequently repeated principle of the earlier chapters on subject-matter.

Form.—Text-books fail to do good service frequently because they are too difficult, as any reader can easily verify for himself. In the second place, as Bagley points out, they appeal only to the eye; while with many pupils the ear is the better means of approach for ideas.

[1] *Method of Recitation,* pp. 121-122.

Our discussion, however, will deal chiefly with the content of the texts.

Section 2. Problems

As just said, a text-book is a compilation of solutions of problems. Hence, every paragraph, section and chapter has a problem of its own. The problem of this chapter I am now writing is, What are the best methods of using text-books wisely? The problem of this section is, How do texts show us the problems they try to solve? The problem of this paragraph is, What is the relation of a chapter, paragraph, or section to problems?

We do not usually ask, What is the problem in this paragraph? We rather say, What is the point of the paragraph? What is the topic discussed? or, What is the theme? But we imply the problem because the point, topic, or theme is the solution of some problem. If the theme is text-books, then the problem is, What is the best method of handling text-books? If the point made is that texts are aids to keen thinking, the problem is, What are texts?

Methods of Showing Problems.—Sometimes the problem is set forth by a question. On page 93, Chapter VI, the paragraph begins, "And now, what becomes of this breath which passes our lips?" Here the problem of the paragraph is set forth clearly.

Again, the theme may be set out in black face, as is the case in this text. A few lines above we find the words, "Methods of Showing Problems." This is the topic; the problem is, What *are* the methods of showing problems? This merely requires a little juggling to bring out the problem in problem form.

Occasionally marginal insertions are made, as, for instance, in Chapter XI of Dewey's *How We Think,* insertions are made down the margins of pages, the dash here indicating the end of each insertion: "Empirical thinking depends upon past habits—it is fairly adequate in some matters—but is very apt to lead to false beliefs—and does not enable us to cope with the novel—and leads to laziness and presumption—and to dogmatism." Here we have the solution syllabicated. The student, glancing at the marginal readings, knows what to look for in reading the body of the text.

Topic sentences are usually put at the beginning of paragraphs, and show what solution or problem is presented. "*A man of polite imagination is let into a great many pleasures that the vulgar are not capable of receiving.* He can converse with a picture, and find an agreeable companion in a statue. He meets with a secret refreshment in a description, and often feels a greater satisfaction in the prospect of fields and meadows than another does in the possession of them. It gives him a kind of property in everything he sees, and makes the most rude, uncultivated parts of nature administer to his pleasures. *So that he looks on the world in another light, and discovers in it a multitude of charms that conceal themselves from the generality of mankind.*"—Addison.

Titles in a general way often throw light on the specific problem to be discussed. *Methods of Teaching* is fairly exact. So also is *Practical Rhetoric.* Chapter headings indicate the subject and imply the problem. Sometimes they do not, as in *Hamlet, Kubla Kahn, Macbeth.* Hamlet's problem is the problem of indecision, and Macbeth's, of unfettered ambition,—problems not shown in the title.

Sometimes the problem cannot be put into the phrasing of a single sentence. Genung says,[1] "When the paragraph

[1] *Practical Rhetoric,* p. 195.

is descriptive or narrative, or when it is merely an accumulation of details of any kind, the subject cannot be so easily reduced to a proposition, but must be gathered from the general bearing of the whole."

Sometimes the text shows how the problem arises; usually it takes the value of the problem for granted. Note, for instance, the problems this text discusses. Run through the section headings and the introductory paragraphs of each section and see that only occasionally is it shown how the problems discussed arise. Texts usually assume that the problem discussed is potential and will become active as soon as it is mentioned.

Weakness of Text.—In spite of all this effort to make the problems clear, many texts are not coherently written and are difficult to analyze into problems. Then, again, the assumption that interest in the problem will spring out at the beck of the reader is not safe. Hence, material may be read presenting solutions of problems which the pupil does not have and he may read because of certain generic motives, as the performance of a required task.

To use the text intelligently, it is therefore necessary that the problem of the unit be a problem in the minds of the pupil. In other words, pupils should usually not approach a text without the problem having been made active by the teacher, or otherwise. The order of the text can seldom be followed without digression.

For instance, in teaching the first edition of this text the writer has taken up the chapters in this order: Control of Values, XII; Forms of Instruction, XIII; Methods of Development, XIV; Motive, IX; Motive, VIII; etc. On other occasions, with other classes, the order has been changed again. In no case has the identical order been maintained twice. And if a teacher using his own text feels under necessity of changing the order of the problems from class to class and from year to year, in order to get into closest touch with the students' problems as they unfold in serial form, it is evident that one using a text which he did not write would have to vary the order still further. Yet there are teachers who will not vary the order of selections even in a reader.

Section 3. Data

Weakness of Text.—As a means of developing subject-matter and allowing the student to participate in the full solution of a problem, the text has a serious handicap, with regard to data, in that the data collected are not all shown. Only those used are mentioned.

The following interesting case given by a student illustrates this:

"A few months ago I was preparing an article for the *Missouri School Journal* on the subject of ethics in high school. The main problem was, 'How can practical ethical instruction be given to high school students?' and that was divided into four sub-problems:

1. Showing the importance attached by the public to ethical questions.
2. The immediate need of practical ethical instruction for young people of high school age.
3. The various objections to be raised to doing this.
4. Best methods of giving such instruction.

I accumulated a great deal of data, especially data that had to do with the first point, of the importance of ethical questions. The first outline will show the data that were at hand and the second will show the outline of the article as finally written:

I. How Can Practical Ethical Instruction Be Given to High School Students?

a. Proofs of the importance attached by the public to questions of ethics.

1. Change at the Missouri penitentiary from the old striped convicts' suits.
2. Adoption of a parole system for first offenders.
3. Industrial farm near Kansas City, for boy law-breakers.
4. The rule adopted by the Bankers' Association of Kansas in regard to borrowing money to purchase motor cars.
5. Increasing interest in arbitration.
6. The great conservation projects.
7. Pure Food Law.
8. Railroad Rate Regulation.
9. Compulsory Education Laws.
10. Prosecutions for graft.
11. The "Insurgent" movement in politics.
12. The Scout movement.
13. The Liquor Agitation.
14. Bank Guaranty Laws.
15. The "Big Brother" movement at Christmas time.
16. Boys' Camps.
17. Free Legal Aid Bureau.
18. Free Sunday Concerts.
19. Playgrounds.
20. Milk Inspection in Cities.
21. Free Ice in Tenement Districts.
22. Very general interest in the principle of "the square deal."

II. The Skeleton outline for the article as finally written is as follows: How Can Practical Ethical Instruction Be Given to High School Students?

a. Importance of Ethical Questions as shown by the public attention to them.
   1. Penitentiary Suits.
   2. Parole System and Industrial Prison Farm.
   3. Laws in regard to Pure Food, Railroad Rates, and Compulsory Education.
   4. Graft prosecutions.
   5. "Big Brother" movement and similar projects.

If a student is to develop his solution and uses the text, he is, of course, handicapped, because he sees only the few points selected. He does not have exercise in selecting and rejecting the data.

Reference Work.—However, this can be obviated in great part by the use of more than one text and by the setting of problems that will require the gathering of data from all the sources.

A student makes the following statement showing how this can be carried out in history. In this statement a brief résumé of what is found in each reference is given to aid the reader.

The lesson is upon the origin and results of Jackson's Spoils System.

The references are as follows:

Ashley's American History, p. 301, one page. An explanation of the term "Spoils System" is given. Jackson's attitude toward opposing parties is given; that is, his loyalty to friends and his opposition to enemies. He was besieged by a number of office seekers who gave him no rest. Fifteen hundred office holders were removed within less than a year. No reason was given. No precedent had he for it. The "kitchen cabinet" is next described.

Channing, p. 390, one page. Earlier there was little change in national party machinery and little change in state party machinery, save in Pennsylvania and New York. Van Buren and Marcy were important in the state changes that had been made, and they saw nothing wrong in the spoils belonging to the victor. It was expected that Jackson would reward his friends; this he did. Within nine months over one thousand office holders had been removed. Jackson wanted good men, but on account of the number a poor inspection necessarily was made. He broke away from all precedents, and advised freely with his kitchen cabinet.

Wilson, Division and Reunion, p. 30, four pages. Meeting of the Twenty-first Congress took place nine months after Jackson's inauguration, and this Congress disclosed many evidences of what the new administration was to be. Delicate questions were to be handled. A radical reconstruction of Civil Service had taken place, and it had startled and repelled some of the Jackson men. More than one thousand removals before Congress met had taken place, against seventy-three removals for all previous administrations. Adams said that very few reputable appointments were made. Webster gave a quotation not complimentary to the administration. The number of federal officers was increasing yearly, and the crisis in public service had now come, and in the removals Van Buren said, "We give no reason." The Senate rejected some of the worst names, and looked for means to defeat unprecedented schemes, but failed. The President's message gave some explanations for the removals, but they were very vague. His explanations were as follows: He spoke of the corrupting influence of long terms of office. No one ever acquired the right to office by holding it. Yet no proof was given that these long termed officers had been corrupt.

Jackson, however, was probably not responsible for the unworthy men, yet a great many mistakes were made. This responsibility rested on the officers of Jackson. Jackson was a soldier, not a politician. He was controlled largely by such men as Van Buren and Marcy; as shown by the Albany Regency, he was ruled by politicians.

McLaughlin, p. 324, one page. Before this time inefficiency or dishonesty was the cause of the removal of office holders. Adams removed only two men in his whole term. He did not reward his friends by public office. Jackson thought that the office holders under Adams were an incompetent and corrupt lot. He thought those who supported him were his friends and those who opposed him his enemies. The whole of the administration of Adams was given no consideration by Jackson. With this feeling and the aid of influential men he began the wholesale removal of office holders and introduced his Spoils System. An excellent definition of the Spoils System was given in this text. He reorganized his cabinet, and many men were not of wide experience.

Johnson's High School History of the U. S., by MacDonald, p. 285. Postmasters, clerks, marshals, etc., not supposed to take part in political contests. They did their work and were paid for it. Naturally, Jackson began by removing them, regardless of faithfulness. After him, other administrations followed. This continued until 1887, when the Civil Service was introduced. Yet the Spoils System had very bad results.

The guiding questions with reference to this lesson should be given as follows:

(1) Tell of the previous conditions in regard to office holding. (See Ashley, page 301; Wilson, page 30 and

following; McLaughlin, page 324; and Johnson's High School History of the U. S., by MacDonald, page 285.)

(2) What conditions arose that caused a change? (See Wilson, page 30 and following; McLaughlin, page 324; Channing, page 390.)

(3) Describe these changes. (Wilson, page 30; Channing, page 390; Ashley, page 301; McLaughlin, page 324.)

(4) Give results of the new system. (Johnson's High School History of the U. S., by MacDonald, page 285, and Wilson, page 30 and following; Channing, page 390.)

An exercise like this will lead to the collection of data by the pupils, and will, in addition, give them a wholesome skepticism about the infallibility of a text-book. For, as in the above problem, authors not only differ but contradict each other.

Upon this point Miss Earhart says,[1] "The student is not limited to the author's text, however, but may draw upon his own experience and upon his imagination. He may read books, papers, and magazines, and may talk with people who are informed in regard to the subject he is studying. He may perform experiments and make observations. In any or all of these ways he may supplement the author's text and add largely to the material bearing upon his problem. The criterion for acceptance here, as in other study, is the relevancy of the facts to the problem. That which is irrelevant should be rejected, and only the relevant accepted. If, for example, the problem is, 'How the mineral products of the Western States have influenced the development of those states,' then students engaged upon such a problem may neglect all the statements made by the author which do not bear upon it, but they must sift out and accept that which contributes to its solution.

[1] *Teaching Children to Study*, pp. 85-6.

It may be urged by some that this gathering of data will consume more time than the class has at its disposal. However, rejecting irrelevant matter saves time; and the examining of other sources than the book can be divided among the members of the class, so that the labor is divided. The interest arising from the presence of a problem will also quicken the efforts of the pupils, and so save time."

Sutherland pricks a bubble blown in the old days of the text-book method.[1] "The idea often held that pupils must never look into their books while in class, is old-fashioned and traditional. Quite often the recitation period may very profitably be spent with books open and pupils intent on answering questions from maps, interpreting pictures, verifying inferences, or getting correct meaning from difficult sentences. Every teacher who secures good results must find such 'study-recitations' necessary. Too often pupils are put to tasks without preparation; waste of time, mental confusion, and discouragement are quite sure to follow."

This does not mean that the text may be used to shield a student who does not study. It assumes that students are willing but that plenty of problems arise in which reference to the text saves time and fosters exactness.

Section 4. Hypotheses

Weakness of Text.—In a text-book the author usually gives the correct hypothesis and the pupil thereby loses the exercise and efficiency gained by participating in hypothesis-forming and testing. A few examples will make this clear.

In a geography we find the sentence, "The great round earth is a huge ball, or *sphere,* called the globe." Needless to say, that does not recount the endless arguments pro and con, nor take into account the hypotheses which went

[1] *The Teaching of Geography,* p. 180.

before it and which are to-day dying a stubborn death out in the open country. "The body is made of cells." This leaves out of account other hypotheses held prior to the formulation of this hypothesis. "The moon is a satellite of the earth," "The blood circulates through the arteries, capillaries and veins under the impulse of the beating of the heart," are all simple examples that come easily to mind.

Section 5. Verification

Text-books frequently make statements (give solutions) without attempting to show readers that they are correct. Numerous examples of this can be given:

(1) "Objects may be used as the best means of training children to talk with the pencil."

(2) "The written word to the little child has no element of attraction."

(3) "The foundation of spelling should be learned entirely by writing; every word that the child learns from the blackboard should be carefully copied on paper."

(4) "Geography is the very best means of developing the powers of imagination."

The author, so far as the reader is concerned, assumes these facts to be true.

Now, if these facts are to be accepted by the reader, they must first be verified.

How Are Facts Verified?—Facts should be put to the test to see if they hold for the reader's experience. In the statements just made questions like this will arise:

(1) Is it true that objects *are* the *best* means of teaching drawing? Couldn't children learn to draw better, in the beginning, at any rate, by drawing fanciful pictures and by illustrating stories, etc.?

(2) Do I not know of cases where children *were* greatly attracted by written words?

(3) Does this exclude visual memory and auditory memory? If so, is the statement not too narrow?

(4) Are literature, fairy stories, and pictures not just as good or better means, etc.?

In many cases the author gives his own verification in the forms of application. The reader may look over this text for cases in which illustrations by way of verification are given, and also for instances in which statements are made without any attempt to verify for the reader.

But because of limitations of space, authors are not able to give a wide range of applications. Nor are they able always to give applications that would be most useful for each individual reader.

It is important, therefore, in every case that the reader make his own illustrations and raise his own objections. To do this gives pupils much worry, frequently, but if it is not done the facts of the text are isolated facts and nothing more. Students have to be drilled upon giving examples "not found in the text." And even then they do not have a wide variety in their examples. This explains why questions have been put in at the end of each chapter. The students will, by being asked always to give examples, develop the habit of application and verification.

However, as Earhart points out,[1] "It is not intended that pupils shall question everything they read or hear. Usually they will not need to have doubts as to the reliability of the statements made. But the attitude of ready acceptance of everything needs to be replaced by the attitude of mind which questions that which seems out of harmony with previous experience, which is startling in its nature, which

[1] *Teaching Children to Study*, pp. 93-4.

seems to lack sufficient evidence, or which seems too general in its scope. Such instances, and possibly others, furnish occasion for thought and investigation as to the validity of the material offered. In this respect, text-book study does not differ from any other study in which data are presented to throw light upon some situation. Judgment as to the soundness of statements is usually necessary, though due credence should be given to the results of the labors of experts in the several fields of knowledge."

McMurry says,[1] "Whether he likes it or not, the student cannot escape the responsibility of determining for himself the fairness and general reliability of the newspapers and magazines that he reads; he must expect bias in historians, and must measure the extent of it as well as he can by studying their biographies and by observing their care in regard to data and logic; he must scrutinize very critically the ideas of the world's greatest essayists and dramatists. If a philosopher like Rousseau offers brilliant truths on one page and equally brilliant perversions of truth on the next page, the student must ponder often and long in order to keep his bearings; and if footnotes attempt to point out some of these absurdities, he must decide for himself whether Rousseau or the commentator shows the superior wisdom. 'Above all,' says Koopman, 'he (the student) must make sure how far he can trust the author.'

"'Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to *weigh* and *consider,*' says Bacon.

"'Every book we read may be made a round in the ever-lengthening ladder by which we climb to knowledge and to that temperance and serenity of mind which, as it is the ripest fruit of wisdom, is also the sweetest. But this can

[1] *How to Study,* pp. 138-140.

only be if we read such books as make us think, and read them in such a way as helps them to do so, that is, *by endeavoring to judge them,* and thus to make them an exercise rather than a relaxation of the mind. Desultory reading, except as conscious pastime, debilitates the brain and slackens the bow-string of Will.'—Lowell, *Books and Libraries.*

"The student, therefore, must set himself up as judge of whatever ideas appear before him. They are up for trial on their soundness and worth; he must uncover their merits and defects, and pass judgment on their general value. If he is hasty and careless, he suffers the penalty of bad judgment; and if he refrains from judging at all, he becomes one who 'does not know his own mind,' a weakling—

'Who reads
Incessantly, and to his readings brings not
A spirit and judgment equal or superior
Uncertain and unsettled still remains,
Deep versed in books and shallow in himself.'"

Alertness and Docility.—Some few pupils display skepticism. The vast majority are docile and take what is given them. This docility is due in part to temperament. Most people take ideas without examining them very carefully. It is due in part to the fact that pupils read so much in school that is foreign to their experience and cannot very easily be verified, that they get into the habit of taking things without examination. The lack of training in mental alertness is responsible for the remainder. Teachers are sadly negligent in leading children to be alert. Perhaps teachers themselves are not intellectually alert, because they are like most of the people in the world, and because they have been made docile in their progress through the educational mill.

Intensive Study vs. Skimming. — The old text-book method assumed that everything in the text was to be learned thoroughly and in some cases was to be memorized *verbatim*. But when we use the text in developmental work, the problem of the pupil becomes the important factor, and thus not everything in the text is of equal value, and some things are of no value. It follows, therefore, that frequently pupils have to skim texts in search of data or hypotheses or to get facts by which to verify. Nor is this a difficult thing for pupils in the sixth grade and above, as any teacher who has practiced the plan for some time can attest.

Intensive study, however, is made of certain topics in texts where the teacher feels it necessary. Gems of literature, arithmetic processes and problems, exact facts in geography, and others come vividly to mind. Where intensive study *is* made it should be done exactly and carefully. There is a place for skimming and a place for the complete mastery of portions of texts. The teacher should decide which is necessary with each topic, and should so inform the student, who should be held responsible, in the one case, for the important facts to be gleaned by skimming, and, in the other, for *all* the selected matter.

References for Class Reading

Bagley, *School Management*, pp. 190-196.
Earhart, *Teaching Children to Study*, pp. 83-105.
McMurry, *How to Study*, pp. 31-84, pp. 135-160.
Sutherland, *The Teaching of Geography*, pp. 172-181.

Exercises

1. Take a chapter in this text and run through it stating explicitly in problem form as a question in each case, the

problems of the whole chapter, each section and each paragraph.

2. Does your study show that the chapter selected is logically constructed—i. e., does each problem or paragraph bear upon the problem of the section and the problems of the sections upon the problem of the chapter? If not, do you see any excuse for the writer's failure to preserve a logical organization?

3. Pick out from your reading in other subjects five cases in which the author shows how, from the incompleteness that has gone before, a new problem arises which must be solved.

4. Find examples from the texts you are using or have used of methods by which the author gives mechanical hints to show what the problem to be discussed is (as in section 2 of this chapter).

5. Give an example of where you, if a teacher, or your teacher has varied the order of treatment of topics in a text and give reasons for the change.

6. Give, from a paper of your own, an illustration tabulating the data you collected and the data you rejected before writing the paper. Tabulate the points you retained.

7. Describe from your own work an example of a difficult problem in which you formed other hypotheses than those you finally wrote. Tabulate the rejected hypotheses and the accepted solution.

8. Prepare a lesson in which the pupils are expected to use several texts in solving the problem set.

9. Give particular instances in which a pupil was handicapped by an attitude too strongly skeptical. Are such pupils rare or common?

10. Give five instances in which recently you have practiced the virtue of verifying by tests or objections the state-

ments made in a text and found them to be correct so far as you could see.

11. Give five instances in which the statements did not seem to you to hold water in the light of your experience.

12. At what point in the grades is it practicable to begin to have children use texts in the ways described in this chapter? Give your reasons and illustrations.

CHAPTER XVIII

QUESTIONING

Section 1. Function of Questioning

The function of questioning as a *racial* tool is to secure information from some one who has more information than the questioner. This is the ordinary use of the question outside school. There is some value I wish to control. I cannot do so. Then I question some one who I believe has the information. I am in doubt about what to do. I ask a friend, "What would *you* do?" I may need to know a fact in history. I question an historian. I may have an unknown infection on my hand. I speak to the doctor. Ordinarily outside of school questions are asked by people who are seeking information and not by those who give the information.

In school some questions are asked for the elemental purpose of getting information. But the majority of questions are asked by the teacher who knows the answer to the question. In fact, if the teacher asks questions of which he does not know the answer, he is ordinarily looked upon by outsiders, at any rate, as incompetent.

The query arises, at once, should not the function of questions in school be the same as it is outside of school? And the answer to this will be given under a discussion of three types—informational, testing, and developing questions.

Informational Questions.—By informational questions is meant questions that are asked because the questioner is seeking for information that he does not possess. Such questions do arise in school work and are provocative of the greatest interest when asked. The interest is great because the one who answers the question feels that he is giving something of value which he possesses to one who is interested but does not possess it. This is the motive for all language as seen above in Chapter XV.

Pupils may ask questions. Unfortunately they do not ask as many questions as they should. Not for the reason that they understand everything, but because they do not recognize the difficulties. This failure to recognize difficulties is due partly to a lack of interest which keeps them from going into the subject as fully as they might if interested, and partly to the fact that most of the things learned in school are not carried over into practice. In illustration of this latter point any teacher can call to mind cases in which pupils have said, "Oh, yes, I understand that perfectly," then upon applying the principle find that they did not understand it at all. A pupil recognizes a difficulty when he cannot understand, verify, or apply a fact or method, and if he cannot work it out for himself he will ask questions. Manual training, cooking, art, and all subjects capable of concrete application are especially provocative of questions when interest is present. Other subjects are equally so if they are studied as means of solving the learner's problems.

The teacher should, also, ask informational questions. This does not mean that a teacher should not "know his subject." For every teacher can know the *principles* of his subject and yet not know all the details. Expert chemists have been known to search among primitive peoples for new methods of dyeing. Expert naturalists can gain much information from woodsmen about the lives of forest animals. The expert historian cannot remember or know all the facts of his field and accepts them from others. Many boys and girls can give the teacher information about various things which the teacher, though adequately trained, has never known.

Many teachers fail to ask these questions, partly because some teachers are not alert and curious and do not wish to know, and partly because they are unwilling to let the pupils feel that they can tell them anything new. Teachers of the latter class may hesitate because they think it will undermine their authority. But this is wrong. If a teacher knows the fundamentals of his subject, is a master of them, he will greatly enhance both his authority and the esteem with which he is regarded by allowing and encouraging pupils to bring in what *they* know.

There is probably nothing more inspiring to pupils than to feel that they can make an original contribution. If Johnnie can utilize in class a knowledge of history gained by private reading he will be joyous in his work. If Mary can show a fancy stitch, can relate a pertinent personal experience, she will feel that school is by so much a finer and more interesting place.

Sometimes the alert teacher can bring this effect about by laying stress upon personal opinion. In a history lesson a question may be asked, "What is the explanation of the Pilgrim Fathers' selecting Plymouth as a landing place?" The teacher knows the answer. But if the question were asked thus, "What do *you* think is the reason for the Pilgrim Fathers' selecting Plymouth as a landing place?" it becomes informational, if there is any possibility of difference of opinion, for the pupil is asked to give *his* explanation, which may easily be original.

This stressing of individual opinion is very valuable wherever there is any possibility of difference of opinion, and the teacher may gather much information, even from young pupils, that he has not known before. It is valuable to repeat because the one who answers the question has the motive of all language; viz., to give *his* interpretation of a fact—information which no one else has, since no one knows what *he* thinks. It is so important that teachers should cultivate it and utilize it whenever possible.

In conclusion, to reiterate, this type of question can be used with greater freedom than teachers show in its use. There are certain things that a teacher is supposed to know about a subject and he should know more about them than his pupils know. But there are myriads of things of great interest to pupils which he need not know and which he can gain from his pupils, not only without a diminution of respect, but with an increase of both admiration and affection.

Test Questions.—By test questions is meant questions which are asked to show whether the pupils have or have not a satisfactory hold upon subject-matter.

It is, of course, not always necessary to ask questions to find this out. Solutions to problems in arithmetic, when glanced over, indicate usually the hold the pupils have upon principles. Articles made in handwork and drawing, edibles cooked in domestic art, indicate the efficiency of the student usually without questions. In all concrete material there is less necessity for test questions. The test is made by the teacher by inspecting the finished product.

In subjects more isolated from concrete application such as history, literature, civics, physiology, etc., it is not easy to test in all cases without questions. But in those cases the fewer questions asked the better, if they are of the right sort. This means that the questions should be topical, and require an extended reply or report. This will obviate the piecemeal recitation (in which the teacher asks a whole series of petty questions) that calls for no organization by the pupils.

In all subjects whether capable of concrete tangible application or not, questions are necessary sometimes to test points that are not obvious in the finished product. A student's knowledge of grammar should in the last analysis be tested by his ability to use grammatical English, but sometimes it becomes necessary to go behind the correctly used form to find out why the pupil uses the form, and this is done by a question. Sometimes a well-made cake will not show which method the pupil has used. This will be discovered by questions.

Test questions are usually of two sorts. They may emphasize either memory or thought. Tests of memory call for a reproduction of something learned before. Asking pupils to repeat a definition, a multiplication table, a selection of poetry, dates and rules are all of this sort. Tests of thought may be used on the same material. The pupil, instead of being asked to define a grammatical term, may be asked to parse a word whose class is defined in the definition; instead of repeating a multiplication table, he may be given a problem in multiplication; instead of being given a rule, he may be given a question in which the rule is to be applied.

There is a place for both sorts of tests. Teachers are, however, more likely to use the first than the second, either because they do not think about testing thought or because they do not want the extra trouble involved.

Developing Questions.—By this term is meant questions which are asked for the sake of directing pupils in their thinking. Their purpose, as distinguished from that of testing a question, is that they are understood by both teacher and pupil to be in the nature of a hint or suggestion.

Sometimes the pupil needs help in a solution. The teacher may ask, "Have you all the data you ought to have?" This question directs him to the reconsideration of his data and may be just what he needs. Again he may have reached a point where he cannot see the hypothesis. The teacher may say, "Will this do?" Or he may have overlooked a point in verification and the teacher may say, "Is this right?" and set him to work again.

In the following quotation a series of developmental questions are asked. The pupils are to form a definition (generalization) of *number* in nouns.

INTRODUCTION

Briefly review the Noun.

DEVELOPMENT

1. Let several pupils give statements about objects and write on the blackboard such as are useful.

1. The window is easily broken.
2. Books are on the desks.
3. Pencils lie on the table.
4. A ruler is useful for measuring.
5. A boy enjoys football.
6. Girls play the piano.

2. Name the nouns used in these statements.

ANSWER. *Books, desks, pencils, table, ruler,* etc.

3. How many objects are referred to by the word *window?*

ANSWER. One object.

To how many objects does the word *books* refer?

ANSWER. To more than one.

Name all those nouns in above sentences used to indicate one object.

Name all those nouns meaning more than one thing.

The teacher writes these in two columns as follows:

One thing	*More than one thing*
table,	pencils,
window, etc.	girls, etc.

4. Suppose we wish to speak of more than one window, what word should we use?

ANSWER. *Windows.*

Deal similarly with the other nouns in the columns, having pupils use the nouns in each case in a sentence. The opposite columns are now filled out, each noun representing one thing having in the opposite column its other form representing more than one.

5. Compare the forms of the nouns in first column with those in second column. The slight difference in form will be noted by the class. Why are these forms different?

ANSWER. To denote one or more than one of the things for which the noun stands.

TECHNICAL TERM

The pupils are now told that this change in the form of the noun to denote one or more than one object is called *number.*

DEFINITION

The pupils will be required to frame a simple definition of number which will be written on the blackboard and the class drilled on it.

I have found that better results come in my own teaching from changing the order of procedure and saying after the problem has been raised, "This is the case of another noun inflection called *number.* In these sentences on the board some nouns have one number, some another. Can you pick out the two classes?"

On one occasion after allowing them to think for a while several of the children picked out the words in each class.

I asked, "How many things do these nouns in the first class speak of?"

Answer. "One."

"How many the second class?"

"More than one."

I then said, "nouns of the first class are said to have *singular* number; of the second, *plural* number. Try them out in other sentences. What is a good definition of *number?*"

This took about three minutes, when I had planned for ten minutes in development. More developing questions were not necessary.

On another occasion my question, "Can you pick out the classes?" did not bring the answer. I thought possibly the trouble was that they did not remember the nouns as well as I thought they would. So I asked them to pick out the nouns which I underlined. "Do you not see any difference in the number of things that each noun stands for?" I then asked.

The answer was forthcoming and we proceeded as before.

If this had not brought the answer I should probably have drawn a circle around each singular noun and then have asked them if they saw any difference between the number of things specified in each member of each group.

I would begin with the statement that we were going to discover the two classes of number of nouns, because I think it is better to let the pupils see the trend of the questions instead of developing step by step. It is better because, if the teacher goes by easy steps, each of which the pupil can take, only the teacher is conscious of possible difficulties. If we set our objective before the pupils they will be the ones to realize their difficulties and do some strong thinking. Moreover, we save time because pupils grasp things more easily than we think. We are much inclined to overdevelop and subdivide questions to the point where the pupils do not have to do sturdy thinking.

When a pupil needs assistance it is usually better to give it in the form of a question than by a direct statement. When he has missed some data it is better to say, "Have you all your data?" than to remark, "You have left some data out." If his solution is wrong it is better to say, "Is this right?" than, "This is wrong." This is true because it throws the effort of thought upon him and he can often by thinking again reach your knowledge. But if you had stated your knowledge he would have missed the pleasure and exercise of reaching it for himself.

In conclusion, it may be said that few questions are true to any one type. They are sometimes developmental and test questions at the same time, or are informational and test at one time. The point of importance is that they serve the three functions and that the informational questions are not utilized sufficiently, the developing questions are not used with sufficient intelligence and comprehension, and that test questions should emphasize thought rather than memory.

Section 2. Structure of Questions

Good questions possess three characteristics, all due to the fact that they are language and must obey its laws. These characteristics are:

(1) They must contain no irrelevant material.

(2) They must contain all relevant material.

(3) They must be understood by the pupils.

Conciseness.—The questioner desires information upon a specific problem. It is supposed that he knows exactly what his problem is. Therefore, good language usage demands, for one thing, that he have nothing in his question which does not belong there—that is, nothing irrelevant. Errors in conciseness usually have one cause: the teacher does not think exactly and does not know exactly what he wants. A common form of question is, What about the treaty of Versailles? What about soils? The only possible source for determining what the answer to such a question should be is the text, for the answer is supposed to be what the text says.

A few examples are the following: What do I want you to do, class? What does this time remind you of? Alexander was the prince of Macedonia, was he not? The Persian fleet did not compare favorably with the Greek, did it? It was a lack of something,—— of ??? Chivalry centered not only around Edward but his son ———, the ———?

Irrelevant Matter.—When a questioner does not know exactly what he wants, he may add much to a question that would not be necessary if he did know what he wanted. This failure to know the point in a situation exactly works against both conciseness and definiteness. It is difficult to make a question definite if the questioner's state of mind is not definite. It is only by chance that he can make his statement concise since he is likely to add material that does not belong to the question.

Section 3. Standards for Questions

Standards of judging the efficiency of questions are in general the same; viz., they must be concise, definite, complete, and clear. But these standards require supplementing when applied to the second and third types.

Testing Questions.—In addition to being concise, definite, complete, and clear, testing questions should be as largely topical as possible. If they are to test they should test the ability of the pupil to organize with a good perspective rather than his ability to recollect isolated details. These topical questions should, if necessary, be supplemented by detail questions. Testing questions should be logically arranged, since a systematic knowledge of the topic is being tested.

Certain sorts of objectionable questions need to be avoided in testing and developing though not in gathering information. For instance, leading questions as, "Robinson Crusoe was lost, was he not?" should be avoided. Or alternate questions, "Was Columbus a Spaniard or an Italian?" Better in the first case to say, "Was Robinson lost?" and in the second, "What was the nationality of Columbus?" Generally speaking, questions that can be answered by *yes* or *no* should be avoided, though frequently it involves much to say one or the other.

The foregoing classes of questions are objectionable because they give too much assistance if one really wishes to test. They are usually easier than is necessary and by slightly rewording them, as above, the teacher can get fuller information upon the knowledge of the pupils.

Teachers who know children can bear me out in saying that children who do not care for upholding their own opinions will watch the teacher for a cue as to the right sort of answer. They watch the inflection of the teacher, his expression, how he uses his hands, any little mannerism that will throw light on what the teacher expects. Hence, a teacher should watch himself to see that his questions are free from inflectional bias. He should change his signals once in a while. It is amusing to the teacher and salutary to such a pupil to lead him on occasionally to make answers which, to the class, are obviously absurd. A few such lessons often cure a superficial, lazy boy.

Developing Questions.—As a general thing developing questions should suggest as little as is economical of the pupils' time and effort. Developing questions reveal, suggest, a possible plan of procedure, call attention to an error or give the pupil an idea. They should not make this too easy, should not "give the whole thing away." On the other hand, they should not leave him to flounder beyond the point of greatest efficiency. Illustrations of these may be found scattered throughout the text.

Section 4. The Socratic Method

The *Socratic Method* has received a good deal of attention and commendation from educators. As a means of getting an opponent into a flat contradiction Socrates was an adept, as is shown in the following free translation of a conversation between Socrates and one of his pupils, given by Baldwin as an example of the Socratic method:[1]

Meno—Socrates, we come to you feeling strong and wise; we leave you feeling helpless and ignorant. Why is this?

Socrates—I will show you.

[Calling a young Greek, and making a line in the sand, he proceeded:]

Boy, how long is this line?

Boy—It is a foot long, sir.

Socrates—How long is this line?

Boy—It is two feet long, sir.

Socrates—How much larger would be the square constructed on the second line than on the first line?

Boy—It would be twice as large, sir.

[Under the direction of the boy, Socrates constructs two squares.]

[1] Baldwin, *School Management*, p. 318.

SOCRATES—How much larger than the first did you say the second square would be?

BOY—I said it would be twice as large.

SOCRATES—But how much larger is it?

BOY—It is four times as large.

SOCRATES—Thank you, my boy; you may go.

Meno, that boy came to me full of confidence, thinking himself wise. I told him nothing. By a few simple questions I led him to see his error and discover the truth. Though really wiser, he goes away feeling humbled.

This is a good, crisp recitation. The questions are well arranged, produce a maximum of thought, and cover the ground in an artistic manner.

But, it is only a paraphrase of the original, and this original which follows shows that practically every question was asked in such a way that it suggested the answer and could be answered by *yes* or *no*. For instance:

MENO—Yes, Socrates; but what do you mean by saying that we do not learn, and that what we call learning is only a process of recollection? Can you teach me how this is?

SOCRATES—I told you, Meno, just now that you were a rogue, and now you ask whether I can teach you, when I am saying that there is no teaching, but only recollection; and thus you imagine that you will involve me in a contradiction.

MENO—Indeed, Socrates, I protest that I had no such intention. I only asked the question from habit; but if you can prove to me that what you say is true, I wish that you would.

SOCRATES—It will be no easy matter, but I will try to please you to the utmost of my power. Suppose that you call one of your numerous attendants, that I may demonstrate on him.

Meno—Certainly. Come hither, boy.

Socrates—He is Greek, and speaks Greek, does he not?

Meno—Yes, indeed; he was born in the house.

Socrates—Attend now to the questions which I ask him, and observe whether he learns of me or only remembers.

Meno—I will.

Socrates—Tell me, boy, do you know that a figure like this is square?

Boy—I do.

Socrates—And do you know that a square figure has these four lines equal?

Boy—Certainly.

Socrates—And these lines which I have drawn through the middle of the square are also equal?

Boy—Yes.

Socrates—A square may be of any size?

Boy—Certainly.

Socrates—And if one side of the figure be of two feet, and the other side be of two feet, how much will the whole be? Let me explain: If in one direction the space was of two feet, and in the other direction of one foot, the whole would be of two feet taken once?

Boy—Yes.

Socrates—But since this is also of two feet, there are twice two feet?

Boy—Yes.

Socrates—How many are twice two feet? Count and tell me.

Boy—Four, Socrates.

Socrates—And might there not be another square twice as large as this, and having like this the lines equal?

Boy—Yes.

Socrates—And of how many feet will that be?

Boy—Of eight feet.

Socrates—And now try and tell me the length of the line which forms the side of that double square: this is two feet—what will that be?

Boy—Clearly, Socrates, it will be double.

Socrates—Do you observe, Meno, that I am not teaching the boy anything, but only asking him questions; and now he fancies that he knows how long a line is necessary in order to produce a figure of eight square feet; does he not?

Socrates' objective was good. He stimulated thought by causing self-contradiction, but his individual questions were not thought provocative. Plato frequently uses his master's audience as a foil to glorify the intelligence of the master. And in doing this he has the audience often following blindly and making admissions that a person of ordinary alertness would hesitate over and perhaps refuse to make.

Taking each question by itself, Socrates did not use good developing questions. If the reader will observe in the portion quoted above, the auditors simply followed Socrates along, agreeing at every step and often agreeing to debatable statements. This is one of the dangers of the developing method. It may make the learner dependent. Pupils cannot always have the teacher present to blaze the trail.

Section 5. Answers

Answers to questions should obey the ordinary laws of language. They should be concise, definite and clear. They should be complete in the sense that nothing should be left out. Further elaboration is not necessary.

One query is raised, Should teachers insist upon answers being always given as complete sentences? For instance, What is the longest river in the United States? In answer to this, will the reply "The Mississippi river" do? Or should the pupils be expected to answer, "The Mississippi river is the longest in the United States?"

Personally, although opposed by every text on questioning that mentions the matter, the writer believes that the only excuse for requiring a complete statement is the failure of a short, crisp answer to carry the idea. Too many classes are ruined by this attempt to be formal. In rapid fire conversation everywhere, it is pure pedantry and a slowing up of interest to use always the complete statement. Nobody insists upon complete statements but teachers, and they do not use them themselves outside of school, and usually not in school. Occasionally a complete sentence is necessary but insistence upon it makes the class work drag and die.

Section 6. Class Questions and Answers

A few simple rules of class management are so obvious that a mere mention of them is sufficient. These rules are important in classes but would not be in individual instruction.

Questions.—It is generally stated that questions should not be asked in rotation because any idle boy, when he has answered his question, can loiter till the next question comes to him. It is similarly wise to ask the question first and name the pupil to answer it afterward. Better say, "What is the best method, John?" than, "John, what is the best method?" The reason is that in the first question everybody feels that he has a chance, or may be called upon, and will therefore think. In the second, it is John's lookout. He has the chance and the working tone of the class deteriorates temporarily.

Answers.—Class answers should not be simultaneous. The reasons are obvious. If it is a testing question it is impossible to get a good idea of what each pupil knows. If it is a developing question the bright pupil takes the lead. If it is an informational question the teacher in the babel of voices finds out nothing. Occasionally in drill work concerted answers are allowable, but otherwise seldom, if ever.

Teachers should not get into the habit of repeating answers. It slows the lesson. If the pupils do not hear the answer let the answerer speak louder.

References for Class Reading

Baldwin, *School Management,* Part VI, Chaps. III and VI.

Betts, *The Recitation,* pp. 55-78.

Keith, *Elementary Education,* pp. 152-63.

Raub, *School Management,* pp. 122-30.

Stevens. *The Question,* pp. 72-86.

Strayer, *A Brief Course in the Teaching Process,* pp. 114-121.

Exercises

1. How will group work assist in having informational questions asked by the pupils?

2. Note in all your classes for two days what informational questions were asked by your instructors.

3. Why are *topical* questions better than *minute* questions?

4. Give examples of test questions that are of the *thought* type which might be asked on this chapter.

5. Give five examples of where teachers have led pupils to rescrutinize their work by asking questions.

6. Give the cleverest example of a group of developing questions of which you know.

7. Add to the examples in the text your own favorite stories and examples of questions that were not concise, definite, or above the heads of the pupils.

8. Is the criticism of Socrates a fair one? Why?

CHAPTER XIX

INDUCTION

Section 1. Origin of the Inductive Method

From time immemorial it has been a habit of teachers and parents to state facts on mere authority. The early psychology of childhood overemphasized the memoriter ability of children and underestimated their reasoning powers. Hence, the method of teaching grammar was to "give" the rules and let pupils memorize them and understand them as well as they could.

Kirkham (1837) deals with the parts of speech in this way as the following quotation will illustrate.

LECTURE VIII—OF PRONOUNS

A *Pronoun* is a word used instead of a noun and generally to avoid too frequent repetition of the same word. A pronoun is likewise sometimes a substitute for a sentence, or member of a sentence.[1]

Then follows some explanation of the definition. The pupils read this and the teachers elucidated the explanation.

The Herbartian Contribution.—But this memoriter method of learning rules on authority had its keen-eyed critics who observed the weakness of such a system, and many attempts were made to correct the troubles. To the Herbartians belong the credit for putting the remedies upon a practical basis. Their *Inductive Method* has done more

[1] Samuel Kirkham, *English Grammar,* 1837, p. 95.

than any other single agency to give the pupil a chance to be more than a memorizing machine.

The essence of their claim is that pupils may, if given proper conditions, discover some rules for themselves. They do not need to take them on authority. Children can reason as well as remember. It is pointed out that all generalizations have arisen by observation of individual cases. Such a proverb as "Honesty is the best policy" is based on the observation of many cases. The theory of evolution is the outcome of an examination of many thousands of cases.

Pupils who live in a society which has these rules and principles already formed get many of them on authority and discover many for themselves. But the inductive method endeavors to minimize the former and to strengthen tendencies toward the latter by training pupils to do their own discovering for themselves.

It is recognized, of course, that some generalizations are too difficult to be made by pupils, and these have to be told them directly. But others are not so difficult and may be made by the pupils. Then, again, some are important and others are not. In all these cases a rule may be laid down that difficult and relatively unimportant rules should be told; easy and important rules should be developed; difficult and important rules or easy and unimportant rules may or may not be developed, as the teacher feels will be wisest.

The Herbartians made a mistake in that they overemphasized the inductive method by making its application too general. "One leading aim of instruction in every important subject is the mastery, in the full sense, of its general truths," says McMurry.[1] This is a moderate statement, but for several years the practical working of the *Five Formal Steps* demanded the forming of a generalization in every

[1] *The Method of the Recitation*, p. 12.

unit of subject-matter. As time went on it became obvious that not every lesson has a generalization as its aim, and so the inductive method has now begun to take its proper place and is proving itself to be a valuable method in that place. That is, the inductive method is of great value *in those lessons in which general truths or rules are to be formulated.*

Secton 2. Definition and Analysis of Induction

Definition.—Before showing how the inductive method works in teaching it is advisable to discuss the nature of induction. For it is not a new method. It has been in use in the sciences as a definite method since the time of its enunciation by Francis Bacon in the seventeenth century. In teaching, it has been utilized for only a century since its enunciation by Herbart in the early nineteenth century and in America for only a few years since its introduction by the McMurrys, De Garmo and other disciples of Herbart in the latter part of the nineteenth century.

Creighton describes induction as follows:[1] "In induction . . . the starting point must be the particular facts, and the task which thought has to perform is to discover the general law of their connection."

Function of Induction.—Throughout the text we have laid stress upon the fact that pupils are always striving to control values. In this effort induction plays a very important role. For, obviously, if we can classify values so that the same method of control may be used for any member of a class of values, we will save time and effort. The dray man forms the generalizations: books are heavy, bedding is light. This saves him many a wrench of the back; for when he lifts a particular box of books or bundle of bedding, he

[1] *An Introductory Logic*, pp. 173-4.

can set his muscles expertly so as to lift them with the greatest amount of ease. If a summer resort visitor knows that the sun burns her face, she can always protect herself in each individual case. "Beware the Greek bearing gifts" is a proverb that in ancient days helped to protect life and property. The rule "Poisons Kill" helps one as soon as he handles anything poisonous.

The function of induction, then, is to simplify the control of values by arranging appropriate objects in classes and by finding out a single method of control that will handle each member of the class concerned.

This must be remembered if induction is to have its due, that we do not make rules and generalizations just for the sake of having them, but because we wish to apply them in handling the concrete situations of life. Just to know that all men are mortal amounts to little unless it influences our actions by making us build with the expectation of death arriving some day, or by assuaging our sorrow when some one dies. Rules of grammar are of little use unless they help us to place the particular to which the rule applies. Arithmetic rules are valueless unless they are applied to particular cases. In other words, we make generalizations only in order that we can handle particulars easily, and efficiently.

Essentials of Induction.—Induction consists of four elements. These are the observation of particulars, their comparison, and the formation of a generalization and verification. In teaching the definition of a noun (a generalization) a dozen cases of the use of the noun can be studied, say in sentences, as:

> The old man hurt his foot.
> John Smith is brown-eyed.
> Chicago is a large city, etc.

The words man, foot, John Smith, Chicago, city, may be studied, then compared, and from these a rule can be formed —that each is the name of a person, place or thing. If the particular cases are not first presented, and if the pupils do not compare them, then it is not induction. The teacher merely "gives" the rule.

Examples.—Frequently pupils form inductions for themselves as in the following case cited by Adams:[1] "A person who knew no German was called upon to make a vocabulary that included over two thousand German nouns. She had to indicate in each case the gender, the genitive, and the meaning of the noun. Her method was the straightforward one of looking up each word in a standard German dictionary, and copying out the relevant details. As the work progressed, she found that she could anticipate with increasing accuracy the gender and genitive of each new noun as it presented itself; till, towards the end, she was strongly tempted to depend upon her general impression, without troubling to verify it by reference to the dictionary."

This shows that unconsciously the pupil gained a mechanical hold upon the gender and genitive form of the nouns. Nor is this by any means uncommon.

Another case cited by Adams in the same connection illustrates this same fact further in a very interesting way.

"A still more striking case is one that occurred under the deplorably bad system of payment by results, that used to obtain in England, in which the teacher's professional reputation depended upon the percentage of pupils he could contrive to squeeze through certain individual examination tests at the end of each school year. A harassed teacher, who had not enough time to attend to the dullards that under this system were the persons of chief importance, tried to get rid of the troublesome clever pupils in her youngest

[1] *Exposition and Illustration in Teaching*, p. 28.

class by keeping them busy with long addition sums, while she devoted all her energy to getting her dullards to work little sums with sufficient accuracy to obtain the coveted pass. Through much practice the clever pupils were able to work the long sums so rapidly that they were continually worrying the poor teacher by coming back for more. To save time in giving out fresh sums, she dictated only one line, say 987,526, and told the pupils to repeat that line on their slates another eight times, making nine lines in all, and then add the whole. The remarkable thing was that after some weeks of this ingenious labor-saving device the poor teacher was more harassed than ever. The children appeared to have acquired a positively uncanny speed in addition. On investigation it was found that the pupils had gradually noticed that there was something peculiarly symmetrical about the new sums the teacher was giving them. Some of the more intelligent among them began to see that it was a pity to waste time adding up a column of nine eights when they had added up such a column a little while ago. They began, therefore, to keep a note of results for future use, and gradually gave up adding at all, except in the matter of carrying from one column to another. The step from this to pure multiplication was easy, but as a matter of fact was not made by the pupils themselves; the secret of multiplication was communicated to them (for a consideration) by certain pupils in higher classes to whom the young experimenters had been talking about the peculiar sums they had lately been having. The net result was that those pupils learnt in a few weeks, and with great satisfaction, the full meaning of the multiplication table and its application, matters that under ordinary circumstances take a whole school year to master."

Generalizations.—The term *generalization* is rather unusual in common speech. But its synonyms are well known. One of these is *rule,* since a rule can be applied in many cases. *Laws* are customary ways of acting. Many cases are observed to act uniformly, hence, law. *Definitions* apply to a whole group. *Principles* are generalizations and *proverbs* are general truths—more usually half-truths.

Section 3. Induction Special Form of Problem

Control of Values.—In chapter 12 we discussed the methods of control of values and particularly control when a problem was present. We found at that time that in reaching a solution of a problem we collect data, make hypotheses, and verify hypotheses when made.

Now, in induction we have a special case of this process. In other words, the problem is that of finding a general truth. There are plenty of other sorts of problems. For example, the problem may be to apply a general truth. But in all cases except where we wish to form rules, principles, or definitions we do not use the inductive method.

Problem.—If we describe induction in this other terminology we may say first, that in induction our problem is to form a generalization. We reach a point where we feel that we ought to have some rule, a definition, or a principle by which to go.

Data.—Our data are our particular cases, and all the other things we know. But essentially we must have particular cases, plenty of them, so that we may observe and compare them. In the case of the girl with the German nouns just cited the data were the different nouns which were handled one by one. In the case of the bright pupils the data were groups of 9 digits exactly alike. To these they added their past experience.

Hypothesis.—The hypothesis is the guess at a generalization. After we have studied a few cases it is natural for the mind to jump to a generalization. Sometimes we do this when we examine the first case. Sometimes the guess is right and frequently it is wrong.

Rules for Forming Hypothesis in Induction.—Logicians have worked out several rules of procedure in forming hypotheses. These have only a slight application to the rough and tumble work of pupils in the grades or in the high school, but they are of some use to teachers and are mentioned here simply that those students who desire to do so may examine them. For a discussion see Creighton's *Logic* and De Garmo's *Principles of Secondary Instruction*, page references in which are given at the end of this chapter.

Solution.—The solution is the correct generalization that is finally accepted.

Verification.—The proof comes with the application of the rules and definitions to particular cases.

Section 4. The Herbartian Five Formal Steps

The Herbartians apply the inductive method to teaching in what is known as the *Five Formal Steps*. These are:

Preparation Presentation Comparison
Generalization Application

The Preparation step reviews necessary past experience and states the aim (the formation of a generalization).

The Presentation step studies the particular cases.

The Comparison step compares these particulars.

The Generalization step draws a generalization.

The Application step applies the generalization.

It will be observed that the first and last steps are added to the inductive process, and that the second, which deals with particulars, the third which compares them, and the fourth which generalizes, are the steps that deal with induction.

I shall proceed in this discussion by giving examples of the use of the method as worked out by F. M. and C. A. McMurry, and will then make one or two suggestions about points at which the method might be improved.

Preparation.—The Herbartians say that the first step in learning a generalization is the preparation of the pupils' minds for the new truth. The preparation consists in the review or calling up of past experience that will be of use to the pupils in learning the new. Because the child learns new things only in terms of the old, as the doctrine of apperception teaches us. "During this step as many related ideas as possible should be called up by the teacher, especially those which are closely welded to the personality of the child. No advance work should be attempted during this preparatory step." The whole idea is to call into consciousness what the children already know about the subject to be attacked.

In addition to this, the aim of the lesson, the point to be learned, should be stated in concrete, definite, simple, short and attractive words.

We can do no better in making this clear than by quoting one or two lessons cited by McMurry.

In a lesson on the Parable of the Tares he says:[1] "The majority of the questions following, although not all, could be given to ten-year-old children.

"*Aim.*—Let us see what Christ meant by his story about removing weeds from the wheat.

"Have you found weeds in a garden of your own? How are they gotten rid of? Why is that so necessary? Is there any danger to the other plants in so doing? Have you

[1] *The Method of the Recitation*, pp. 283-4.

seen weeds growing in grain in the country? Where? In what grains? Is it more or less dangerous to remove weeds from wheat than from your flowers or vegetables in the garden? Why? What, then, does the farmer do with them?"

In a lesson on *The Irrigation of Arid Lands* he proceeds as follows:[1]

"*First Step.*—How can the dry lands of some of our far western states be watered from the rivers?

How are our farms and gardens in Illinois supplied with moisture? Do you know of any of our states where there is little or no rainfall on the plains? Point out on the map the dry region along the eastern base of the Rocky Mountains. What do you know from your geographies of the climate of this strip of country? What business may be carried on here? Grazing and mining. Have you heard of people who crossed the "plains"? Where are the plains? Recall Fremont's trip to the Rocky Mountains. Can crops of grain or vegetables be raised on the plains? What are the difficulties? What rivers flow across this region, and in which direction? Would it be possible to get the water from these rivers upon the dry uplands, so as to use them for purposes of agriculture? Tell what you may have heard of irrigating ditches."

It will be observed in both these cases that the aim is stated clearly and that upon most of the points to arise, related information has been called up.

Presentation.—In this step the particular cases are studied by the pupils. If we are hunting for a definition of *noun,* many sentences containing nouns are studied and the particulars in each discussed to see what each one does.

If a rule in algebra is being developed, the particular cases

[1] Op. cit., pp. 257-8.

are examined. For instance, the pupils may be hunting for a rule for the expansion of a square. They may work out by multiplication the following:

$$(a + b)^2 = a^2 + 2ab + b^2$$
$$(c + d)^2 = c^2 + 2cd + d^2$$
$$(x + y)^2 = x^2 + 2xy + y^2$$
$$(m + n)^2 = m^2 + 2mn + n^2$$

These may be worked out by ordinary multiplication, tabulated, and made ready for comparison.

In the illustration from McMurry[1] on Irrigated Lands four different irrigated sections are studied. The first on the South Fork of the Platte near Denver, with great fulness, the others the Arkansas, at Canon City, the Rio Grande, and the North Fork of the Platte, with less care. The lesson on the Tares mentioned above proceeds as follows:

"a. Now let us listen to the story that Christ told about removing weeds from the wheat. That was in Palestine, and the particular weeds he mentioned are called tares. They are said to look very much like wheat. (Read Matthew xiii:24-31.) (If time allows, at least a portion of this parable could be developed instead of read.) The children, after hearing or reading the parable, relate the same probably two or three times, in order to see clearly the concrete situation. Proceeding, we say, "Why, then, were the servants not allowed to pull up the tares?" The chief answer is that in so doing they would root up the wheat, because the tares stand so close to the wheat that one could not be pulled up without injury to the other.

b. Christ's disciples hardly knew what he meant by this story, and they asked him about it. Do you think you can

[1] Op. cit., pp. 258 ff,

possibly tell what is meant? Let us see. He says that a man having a field of grain may be compared with the kingdom of Heaven. If so, whom might the sower represent? Answer—Christ. And what would the field be? Answer—the world. Who would be meant by the good seed? Who by the tares? When will the harvest be? Who are the reapers?"

Comparison.—In this step, as its name suggests, a comparison of the particulars presented and studied in the presentation is made.

In its simplest form the step consists of one question: "In what respect are these particulars alike?" If this cannot be answered, supplementary questions are necessary. For instance, in the rule for squaring binomials the pupils may not see the resemblance. If they do not, other questions may need to be asked, such as, What is the first term of the binomial? See where it is found in the expanded form. What is the second term? Where is it found in the expansion? What has happened to the first term all through the expansion? What to the second? Now, again, in what respects are they alike?

In the lesson on Irrigation, McMurry[1] proceeds as follows:

"*Third Step.*—Compare now these four rivers — the South Fork of the Platte, the North Fork of the Platte, the Arkansas, and the Rio Grande—as related to the mountains and plains, as situated in reference to the mining cities, and as illustrating facts of irrigation as now carried on. What is the relative importance of the small streams as compared with the large ones for purposes of irrigation?"

Generalization.—When comparison is efficiently carried on the common element is picked out, and this, of course,

[1] Op. cit., p. 268.

is the generalization. In the algebra question the rule, square of first plus square of second plus twice product of first and second, is the generalization. In the lesson on Irrigation, McMurry gives the generalization as follows:

"*Fourth Step.*—In summing up the common features of these river valleys we may observe that they are all in an arid region, that they derive their water supply from the mountains; as they emerge into the plains at the foot of the mountains their waters are carried out to enrich the plains by means of artificial channels. The smaller tributary streams are used in a similar way. The presence of important mining cities near these river valleys and in them makes a ready market for all the products raised by irrigation. The present wealth and population of these districts depend largely upon the irrigating ditches."

Application we shall leave for Chapter XXIII.

Criticism.—As stated before, the preparatory step of the Herbartians reviews past experience and states the aim. In the lesson on the Tares it seems to me that since the real problem of this parable is what to do with wicked people, if there is to be any reviewing it should be a review along that line. We might better take up with the pupils what should be done with very wicked people who were hurting the good? Is capital punishment right, etc.? And then go to the parable to see what Christ thought about the matter. This review for motive is the only one that should be given at the beginning of this lesson. If the problem has arisen in earlier lessons, even that review would not be necessary. Review for aid in solution is discussed in Chapter XXI. It would be enough to say, "You recollect our argument the other day about what to do with wicked people, etc., and I promised to show you what Christ said. Here it is, etc."

The matter which these authors take up in the preparatory step might better come later, if needed, when the interpretation is to be made.

Then, with the problem set, the pupils should read the selection over, and this should be followed by the question, "On which side of this argument does this parable of Christ's show him to be?" If they answer correctly, they should then be asked, "What makes you think so?" And here we would have the motive for a careful study of the story. If they did not see which side Christ took, again we would have a strong motive for studying the story and interpreting it.

Another example in which the whole inductive development would be changed by raising the problem of the lesson at the beginning of the lesson is afforded in Sutherland's excellent little book on *The Teaching of Geography*. An illustrative lesson found on pp. 149-153 is quoted:

"AN ILLUSTRATIVE INDUCTIVE LESSON

(Planned for a Seventh Grade)

Geographical principle to be induced: "The location of cities is often caused by breaks in transportation."

I. PREPARATION

What is the chief product of our home region? To what place is it shipped? How? Southwestern Wisconsin once produced much lead. Where was it taken? Why taken to Galena? How? What did the people of Galena do with the lead? Where is Galena? Show it on the map. On what river is it located? Why not located at the mouth of La Fevre river? Why not at its source? What determined how far up the river Galena should be located? Then what determined the location of Galena?

What supplies were needed in the region of Platteville in early days? Where did the supplies come from? By what route? Trace the route. What was done with the supplies when they had been taken as far by boat as possible? What might this transferring point become?

A few days ago we learned that New York is the richest city in America. Where is New York City located? Point to it on the map.

Pupils' Problem No. 1.—Let us find out how New York City came to be located at the mouth of the Hudson river.

PRESENTATION

From what place did the first settlers of New York come? How did they come? Were their ships large? Could they easily sail up the river? Why not? Who inhabited this region when the white men came? How did the Indian get his living? Did he have any products which the white men might want? What? Where could the white man sell the furs? What could he give the Indian in exchange for them? Where were the "trinkets" secured? How could the Indians get their furs to the white men? Could the white men reach the Indians in the ocean ship? Could the Indians reach the ocean ships in their canoes? Where, then, could the white men and Indians best meet to trade? What might you call such a point? What do we find there today? Then what determined the location of New York City?

A similar study is made of St. Paul and Chicago.

IV. COMPARISON AND GENERALIZATION

Let us now compare these three places which we have studied, to see if we can find one thing true of all of them.

In the case of New York, what were the white men forced to do with the supplies and trinkets they brought to the region for the settlers and the Indians? (Land them.)

What did the Indian have to do with his furs? Could he carry them farther than the mouth of the Hudson river? In this regard, examine both St. Paul and Chicago. What do we find true of all?

At this point the pupils will give a crude general statement, possibly something like this:

In each case we see that the white trader brought his things as far as he could without unloading, and that the Indian brought his furs as near the trader as he could without unloading. These points were near together. Between them a trading-post was made, and later a town grew.

The following questions may be asked about the general statement in order to throw it into the technical form:

What might you say, then, occurred in the routes of transportation for the white man's goods? The Indian's route? Answer, a break. What do breaks in transportation cause? What determined the location of New York City? Why has it since become so large? What determined the location of St. Paul? Of Chicago? Why have they become large cities? What sometimes determines the location of cities?

If it is decided (and it is almost mandatory) to carry this principle through its deductive phase, the mode of procedure may be seen in the Deductive Lesson in the next chapter."

Criticism.—Now, if we begin this lesson by saying, Why were New York, St. Paul, and Chicago located where they are? we could omit all of the first three paragraphs of preparation and begin section 1 with the question, Why was New York located where it is? The remainder of section 1 has been shortened in actual teaching as follows: Why did they not go farther up the river to locate it? Why did they locate at the mouth of a river at all?

A serious difficulty arises as soon as an attempt is made to apply the *Five Formal Steps* to every unit. An excellent example of this is found in Cox, *Literature in the Common Schools*, pp. 114-126.

The lesson is *Old Ironsides*, by Oliver Wendell Holmes, which I reproduce here:

Old Ironsides

Ay, tear her tattered ensign down!
  Long has it waved on high,
And many an eye has danced to see
  That banner in the sky;
Beneath it rung the battle shout,
  And burst the cannon's roar;—
The meteor of the ocean air
  Shall sweep the clouds no more.

Her deck, once red with heroes' blood,
  Where knelt the vanquished foe,
When winds were hurrying o'er the flood,
  And waves were white below,
No more shall feel the victor's tread,
  Or know the conquered knee;
The harpies of the shore shall pluck
  The eagle of the sea!

Oh, better that her shattered hulk
  Should sink beneath the wave;
Her thunders shook the mighty deep,
  And there should be her grave:
Nail to the mast her holy flag,
  Set every threadbare sail,
And give her to the god of storms,
  The lightning and the gale!

I shall not quote the preparation and presentation, because too long. They are well worked out and excellent in treatment. Comparison and generalization I shall quote *verbatim*.

"**Comparison.**—The teacher will think of various examples in history with which to compare the ideas of this poem. This study may be more or less extensive, as the time and occasion may require. It offers, too, an excellent opportunity for the correlation of history and literature. A comparative study of the *Monitor* and the *Oregon* has already been suggested. Shortly before the appearance of our poem the Admiralty of England determined to cut the *Victory,* a one-hundred-gun ship, down to seventy-four guns. The *Victory* was Lord Nelson's flag-ship at the battle of Trafalgar. When the order was published the people raised such an outcry against it that the proposed measure was abandoned. Other studies will suggest themselves to the wide-awake teacher. Children, if put upon the right track, delight in running down such things.

Generalization.—This may be stated as the proposition that in the life of a nation noble sentiment is a vital force."

Now, it seems the clearest thing in the world that the intrinsic function of the poem was *not* to show "that in the life of the nation noble sentiment is a vital force." The author had but one, that an intense purpose in mind, and that was to save the ship. The generalization quoted is a principle that is sound enough, but it is not to be learned from this poem if any semblance to the purpose of the author is to be maintained.

Illustration from Grammar.—A further illustration may be given of the use of induction as applied to grammar. For instance, in the study of adjectives we may presuppose that the thing of value in grammar is to see how parts of speech help us to express our ideas more definitely and easily.

Suppose the noun has already been described as a word which names a person, place, or thing.

Preparation.—A review of the noun will be given to bring its function into the focus of attention. The children may be asked, *Why are we studying grammar?* The answer will be, *To find out all the parts of speech which help us to express ourselves more definitely.* Then the teacher may say, *Today we are to study a new part of speech called the adjective. I want you to tell me how it helps us in making our speech more definite. Here is a sentence with which we may begin: I want the pupil to bring me the book.* Then, turning to the class, he may say, *Do this for me.* The pupils will feel the impossibility of doing as requested. *Well, why don't you do it?* the teacher may ask. The class will, in substance, answer thus: *We don't know who is to do it, nor what book to get.* The teacher will add, *What must I do to this sentence before you can do what I want you to do?* Answer: *Add some more words.* The teacher may or may not say, *Those words will be our lesson for today.* But, in any case, the problem is before them. They see, if they are to get his meaning, something needs to be done to make it more definite.

Presentation.—In the presentation step the particulars are presented. From these the pupils by comparison are to get at the general truth. To that end stress is laid by the teacher in the presentation of each particular upon the element that will be found later to be common to all.

In the teaching of the adjective, the lesson may proceed as follows: The teacher writes upon the board,

I want the pupil to bring me the red book.

Teacher—*Can you do it?* Ans.—*No; there are several red books.* Teacher adds *smallest. Can you do it now?*

Ans.—*Yes.* An afterthought—*But we don't know who is to do it.* Teacher adds *curly-headed* to *pupil,* then writes, *blue-eyed, curly-headed pupil,* and, finally, *tallest, blue-eyed, curly-headed pupil,* asking after each one, *Can you do it now?* We will suppose that as the sentence stands, viz., *I want the tallest, blue-eyed, curly-headed pupil to bring me the smallest, red book,* the process of definition has gone far enough to indicate the particular child and the particular book. The pupil so indicated brings the book.

Teacher—*Why couldn't you do it before?* Ans.—*Not definite enough.* Teacher—*What words gave definiteness?* Ans.—*Tallest, blue-eyed,* etc. Teacher—*What did they make definite?* Ans.—*The pupil you meant and the book you meant.* Teacher—*Let us make this definite—What did "tallest" make more definite?* Ans.—*"Pupil."* Teacher—*What did "smallest" make more definite?* Ans.—*"Book,"* etc.

Teacher—*Let us take another illustration. I am thinking of a dog.* Writes on the board, *It is a small dog. Do you know of what dog I am thinking?* Ans.—*No.* Teacher—*What is wrong with the sentence?* Ans.—*Not definite enough.* Teacher—writes, *It is a small, fat dog. Do you know now?* Ans.—*No.* Teacher—writes, *It is a small, fat, wheezy dog. Do you know yet?* Ans.—*No.* Teacher—writes, *It is a small, fat, wheezy, one-eyed dog. Do you know now?* Johnnie holds up his hand. Teacher—*Well, Johnnie?* Johnnie—*The grocer's dog.* Teacher—*Right. I saw him when I was coming to school today. What was wrong with the first statement?* Ans.—*It was not definite enough.* Teacher—*How did I make it definite?* etc., as in the former example. When enough of these have been covered, the next step follows. It will be noted that in this no generalization is made. The children only see that particular names are made more definite by particular words.

Comparison.—The lesson may proceed as follows: Teacher—*Name all the words that were added to make the meaning definite.* Ans.—The children give the list. Teacher—*What did they make more definite?* Ans.—*"Pupil," "book," "dog,"* etc. Teacher—*What parts of speech do you call the words, "pupil," "book," "dog,"* etc.? Ans.—*Nouns.* Teacher—*Now, who can tell me what part of speech these words make more definite?* The next answer should be the generalization. The last question stimulates them to complete the comparison.

Generalization.—The children's answer in this case is, *They all make the noun more definite.* Then the teacher may give the name, saying, *All words that make nouns more definite are called adjectives.* The pupils may be called upon to give the definition,—An adjective is a word that makes a noun more definite in its meaning.

Application.—In this phase, drill and application take place, subjects to be discussed later in Chapter XXIII.

In the lesson on adjectives, drill may be carried on as follows: Teacher—*What part of speech is "tallest"?* Ans.—*An adjective.* Teacher—*Why?* Ans.—*Because it makes the noun "boy" more definite.* (This is an example of deduction.) Teacher—*What part of speech is "curly-headed"?* Ans.—*An adjective,* etc., etc. The teacher might also ask the pupils to memorize the definition (a good practice), and perhaps in doing so might require them to write it out.

In application, the teacher may ask the pupils to compose other sentences in which they would try to make their meaning exact in this way. He may also have them collect cases in which they or others do not use enough adjectives, and so cause people to misunderstand them, and also cases in which they use more adjectives than are necessary.

NOTE.—The pernicious practice of asking no question which the pupils cannot at once answer has led to the use of too many little questions in developmental work. It is not profusion of questions but artistic economy that proclaims a good teacher.

REFERENCES FOR CLASS READING

Adams, *Illustration and Exposition in Teaching*, pp. 26-29, 145-166.

Bagley, *Educative Process*, pp. 285-304.

Creighton, *Introductory Logic*, pp. 198-218.

De Garmo, *Principles of Secondary Education*, Vol. II, pp. 43-64, 175-221.

McMurry, *Method of Recitation*, pp. 74-117, 185-256.

Strayer, *A Brief Course in the Teaching Process*, pp. 51-68.

Thorndike, *Principles of Teaching*, pp. 154-160.

EXERCISES

1. Give five examples of generalizations you have accepted, so far as you know, on mere authority.

2. Give five examples of generalizations that you have worked out largely for yourself.

3. Give five examples of generalizations that you at first accepted on authority, but later verified and found to be correct

4. Give five examples of generalizations that you had accepted and used, but upon attempting to verify had to discard as incorrect.

5. Name five of your most useful practical generalizations, and show how they take care of a number of particular cases.

6. Give an example showing how you unconsciously form generalizations in a manner similar to the first quotation from Adams.

7. Work out in simple form presentation examples for the teaching of the following generalizations:

    1. It pays to tell the truth.
    2. The square of a binomial equals the square of the first term plus the square of the second plus twice the product of the first and second.
    3. Amount of interest = principal × rate × time.
    4. A verb agrees with its subject in number.
    5. If you dislike people, they will dislike you.
    6. Water expands when it freezes.
    7. An island is a body of land surrounded by water.

8. How many particular cases does one usually examine before forming a generalization?

9. How many must one examine in order to be absolutely certain?

10. How many are sufficient in order to be certain enough for practical purposes?

11. Give an example of where you made a wrong generalization from examining too few cases.

12. In the above cases in exercise 7, would it not be satisfactory to first state the generalization and use the particular cases you collected as examples for verification of the rule after it has been stated? Why?

13. Would it be satisfactory to generalize from one of the examples and use the others as illustrations for verification? Why?

CHAPTER XX

DEDUCTION

Section 1. Definition and Analysis

Definition.—Deduction is the process by which particulars are subsumed under classes. In deduction we label particular events, facts or situations with some general rule. I meet a man and say, "He is a negro. An honest man. A fraud." When I say this I am making a deduction, for I have a generalization about negroes, honest men, and frauds, and I place this individual in one of these classes. The boy who says, "I must multiply 8 by 6 in the problem: Find the cost of 6 lbs. of raisins at 8 cents a lb.," makes a deduction, because he says this is not a case of adding 6 and 8 or of dividing 6 by 8, but of multiplying. The boy who sees an angry bull charging at him and says, "I had better climb this tree," is using deduction, for here is a particular situation which is capable of being handled by a rule for getting out of the way. A doctor who says, "This is a case of typhoid," makes use of this process, for in a mass of symptoms shown by the patient he sees certain things which lead him to place the case in the typhoid class.

The Value of Deduction.—To have keen powers of deduction is a great advantage. Of these advantages the greatest is that implied in the definition. If one has ability to say what each particular thing is, he is able at once to fall back upon his stock of general principles. If I cannot say whether a man is a thief or an honest man, I do not know whether or not to trust him. If I happen to make a mistake and call a thief an honest man, I am likely to lose what I trust to him. If a boy with disaster rushing at him says, "This is a case of patting the animal on the nose," he will likewise suffer. If the doctor diagnoses typhoid as appendicitis, evil results accrue to the patient.

The Work of Induction and Deduction.—Induction manufactures rules, deduction applies them to particular cases. Induction enables me to find out what nouns, verbs, adjectives, multiplication, percentage, commission, laws of climate, and rules of hygiene are. Deduction enables me to label each situation I face with the tag belonging to the appropriate rule.

While I may make one new generalization a day, I apply those already made to a thousand particular cases. Hence, while induction is important, since our rules need to be right, deduction is used much more frequently. In fact, there comes a time in life when it is almost impossible to manufacture new general rules and attitudes, and, as a consequence, new sorts of situations that cannot be handled by the rules made twenty years ago are botched by "old-timers," who are called "old fogies," "back numbers," and other such inelegant names. But every person is, in handling his actions from day to day, pretty much at the mercy of the stock of rules and principles he has on hand, particularly after he is too old to learn,—a calamity that comes to some at twenty, to most at forty, and to a few choice spirits at seventy or later.

Analysis of Deduction.—Logicians usually analyze deduction into three phases,—general principles, a particular case, and the inference which places or subsumes the case under its appropriate principle.

The formal cases are usually thrown into the form of the syllogism; as, for instance, the question arises, Is Socrates likely to die? Now, we happen to know that all men are mortal. This is a principle that is established and that we always rely upon. We know that Socrates is a man; the conclusion is therefore clear that he must die.

Here we have an example of the three elements in syllogistic form. We want to know in particular whether or not Socrates will die. This is, presumably, a very important particular case. I may be wondering about placing life insurance upon him, or I may be his greedy and ungracious heir. But in any case I want to know what to do. Now, I have a great mass of principles that I believe, depend upon, and upon these I base my actions. Inference here steps in and searches for an appropriate principle. I happen to know that Socrates is a philosopher, but that inference leads nowhere. I remember that connubial dangers lurk in waiting for Socrates, but I am not sure that he will not escape those. That inference leads me back to uncertainty. I am not sure that such infelicities result either in death or longevity. Finally, inference strikes upon this: Socrates is a man, and I, knowing all men are mortal, now know that Socrates must die, and govern my actions accordingly.

Making Inferences.—The making of the inference is the most difficult of these phases. Numbers of general principles, rules, methods of control, and so forth belong to the equipment of everybody. For the most part, these are efficient, although the slight difference between an educated and an uneducated man lies in very considerable part in the superiority of the generalizations of the former. Particular cases confront all of us all the time. But inference which searches among the general stock and finds the cap that fits the complexion, size, and style of the particular case, is absolutely invaluable and more elusive.

To a certain extent, inference, or searching for connections, can be carried on by rules; but for the most part, as in the forming of hypotheses, of which it is a special case, it is a more or less haphazard thing which can be influenced by experience, by training, and by that wide scientific training which stocks the mind with efficient rules for handling cases. The man who is an expert in a field can in the long run be counted upon to make more correct inferences than one not an expert. James spoke wisely when he said that about all one can do in such a case is to saturate oneself with all the facts of the case, hoping thereby that the inference will spring forth.

It is possible in many cases, by careful examination of the facts, to narrow the search for inferences by collecting all possible cases and eliminating them one by one.

Thorndike[1] says in this connection: "They are easy in proportion as the number of possible classes under which to think of the fact in question are known and are few, and in proportion as the consequences of being in each of such classes are known. Thus *brevity* can be only *a noun* or *not a noun,* and to decide that it is not a noun one needs only to decide that it is a noun or that it is not a verb, adjective, article, etc. How to translate *arma* in *Arma virumque cano Troiæ qui primus ab oris,* etc., is easy, because *arma* can only be nominative, accusative, or vocative plural of *armum,* or an imperative of *armare,* and because the consequences of being nominative plural, being vocative plural, etc., are well known."

Section 2. Deduction, a Special Form of Problem and Solution

Problem.—Deduction, like induction, is a special form of the solution of a problem. In deduction the problem is to make inference. We do not make deductions at random. There is always some thing to do, some problem to solve,

[1] *Principles of Teaching,* p. 161.

some need to satisfy. Shall I say "Have went" or "Have gone"? This leads to deductive reasoning, for I recollect that *gone,* not *went,* is the past participle, and that settles my question. How shall I make the children more energetic? I refer to principles of heating and ventilation. What is the amount of interest on this note? I refer to rules for computing interest. In all these the important thing is that we start with a problem. We have to make an inference that will allow us to go about our business.

Data.—The data are the particular case and the appropriate principles. These are both given in explanatory deductions, but the principles alone are given in anticipatory deduction. (These terms will be explained in the next section, and until then the explanatory type in which both principles and data are given will be discussed.) That they are given is evident at once. In the sentence *Arma virumque cano,* the question may be asked, What is the case of *arma?* Now, the particular *arma* in its setting is given here before me, but so, also, are the rules of Latin grammar given, and found in my head, or in a book, from which I can probably transfer them to my head. In the question, What kind of flower is this? I have given the specimen in my hand and the classifications of botany in my past experience.

Of course, if the principles are not in experience, the process stops there and the deduction cannot be made. I am ignorant and helpless. Hence the principles must be in the data.

If the principles are not among the data, and if the problem is a pressing one, we have a strong motive for making inductions or of searching for principles that will be accepted on authority. If I really wish to know to which class the flower belongs, and do not know the necessary botanical facts, I will make a strenuous effort to acquire the knowledge. If a doctor has a case before him and does not know what inference to make, he will at once anxiously consult his authorities—unless he is the doctor who said, "I am uncertain as to what is wrong with the patient, but if we can throw him into a fit I am great on fits." In such case he would refer all cases to his one pet set of methods of treatment.

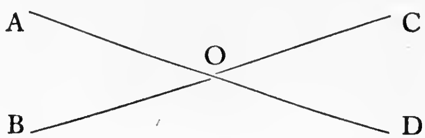
Hypotheses.—The inferences made are the hypotheses. They are the guesses which are made in the attempt to solve the problem. This flower is an hepatica, a rose, a lily, are each guesses, or, in this case, inferences. The patient has malaria, ague, typhoid, are also possible inferences, or hypotheses. *Arma* is in the ablative, the nominative singular, or the nominative plural, are also inferences and hypotheses.

In the chapter on Induction we mentioned references in which would be found rules for assisting in forming hypotheses. Deduction also has its rules for inferences, which are stated by Thorndike[1] as follows:

"It is made easier (1) by systematizing the process of search, (2) by limiting the number of classes amongst which the pupil must search for the right one, (3) by informing him of classes which include the right one and which he would neglect if undirected, and (4) by calling his attention to the consequences of membership in this or that class. Thus (1) to ask a pupil, "What word does *arma* come from? What declension is it? What cases can it be?" makes the inference about *arma* easier than if he were left to an unsystematic trial of one translation after another. Thus (2) the question, "What will probably happen to Norfolk, Virginia, in the next thirty years?" is far too hard for eighth grade pupils, but "Which is the more likely, that Norfolk

[1] *Principles of Teaching*, pp. 163-4.

will increase its commerce or lose it?" is an appropriate question. Thus (3) the task of the pupil who is trying to



prove as an original proposition, "If one straight line cuts another straight line, the opposite angles are equal," is made easier if he is told to think of all the angles of which angle AOB is a part and of all the angles of which angle COD is a part. (4) Help could have been given in the translation by suggesting that *arma* as accusative could find a place in the sentence as the object of *cano;* in the geometry original by pointing out that the angle BOC is equal to angle AOD; in the question about Norfolk by asking, "What sort of harbor has Norfolk? How near is it to European ports? To the wheat fields of the West? To the coal and iron district of West Virginia?" etc.

Verification.—The verification of an inference is exactly similar to the general case of verification. If it works when it is tried on, then it is correct. If I decide that the flower is an hepatica, and if it answers to all the tests, it is correct. If the doctor decides that the disease is typhoid, and if, upon the application of the methods of handling typhoid, it yields, he is satisfied that his inference was correct. If the decision that *arma* is accusative plural, neuter, makes a sensible translation, the student's verification is satisfactory.

Section 3. Types of Deductive Lessons

Bagley makes a distinction full of significance for teaching, between what he calls the *explanatory* type and the *anticipatory* type of deductive lessons. The essential difference between these two is this: The explanatory type explains why a particular case *is* as it is in terms of principles and rules; the anticipatory type *guesses* what a particular case will be because of the principles and rules that *will be* involved in its occurrence. A simple illustration will make the difference clear. The question, Will rice grow in Missouri? is anticipatory, because the conditions of temperature and moisture necessary for the growing of rice are known, and I can infer or forecast the kind of place in which it will grow. If such places are found in Missouri, then rice will grow in Missouri. But if the question is changed to, Why does rice grow in Louisiana? I have the explanatory type. For here there is no guess about its occurrence, since it grows there now, and all that we have to do is to explain the occurrence.

Value of the Anticipatory Type.—A moment's consideration will show the great superiority of the type of mind that is capable of this anticipatory reasoning. People of this sort are the ones who in the confidence of their scientific knowledge venture upon a new enterprise and trust its successful outcome to their judgment. The Agricultural Department at Washington is doing this sort of thing all the time. Its agents search foreign countries with a fine-tooth comb for commercially valuable plants, determine the conditions under which they grow, and then infer the locality in this country in which they would be successful. And in this way many things once imported are now grown in abundance at home. The merchant who says, This is a good location for a store; the farmer who grows a new kind of crop; the real estate man who opens a new addition; the engineer who successfully builds a bridge, all use this type if they have not depended upon chance. The inventor, the progressive, and the radical think in this way.

It is an easy thing to explain why the imported seed grows after it has grown; why the merchant chose his location wisely after it has proved successful; why the real estate man made money, after it has been made; and why the bridge stood the strain after it has been tested. It is easy for other people to copy, once the new anticipation has been realized. But it is original, exhilarating, and superb to be able to forecast what will happen from what is known. Every great advance of any sort was born as a correct and, in these latter days, usually as a scientific guess.

Another reason for its use is that it appeals to the puzzle instinct. Children enjoy guessing at what will happen, and progressive adults do not differ from them in this respect. Mere guessing should be discouraged, but inferring or judging should be encouraged, and verification will winnow the wild from the wise judgment.

Examples of the Explanatory Type.—Bagley has worked out one example of each so well that I shall quote them here. This terminology differs from that used here, and I shall take the liberty of modifying it into conformity with ours.

Illustrating the explanatory type, he says:[1] "Geography again furnishes some excellent examples of this type of deductive lesson. Assuming that the essential conditions of a good wheat country, a good corn country, a good cotton country, etc., have been developed by a careful inductive study of types in the United States, these principles may then be applied to the explanation of wheat, corn, or cotton belts in other countries. Thus the raising of wheat in

[1] *Educative Process,* p. 313.

European Russia is a fact that may well merit a development lesson of the explanatory type.

Problem.—Wheat is grown in the central and southern portions of European Russia. Let us see why.

Data.—What conditions have we found to be essential to a good wheat country?

Climate: cool, with sufficient but not too much moisture—at best, thirty to forty inches annually, with even distribution. Hard wheat grows only in cool climates with fairly vigorous winters.

Soil: fertile, not marshy, not exhausted. Ground fairly level, for convenience in harvesting.

Other conditions: easy transportation, water preferred; land relatively cheap, population not dense.

Inference.—Then if Russia is a good wheat country, it must fulfill these conditions.

Verification.—Let us see if this is true. What is the climate of central and southern Russia? What is the nature of the soil? What can you find out about the rainfall? What means for water transportation? What conditions would render land relatively cheap? etc."

Further illustration of the explanatory type is not necessary because it is so commonly known and understood. For wherever the question *Why* is asked, we must explain by reference to principles and rules.

Examples of the Anticipatory Type.—Because of the importance, difficulty, and novelty of the anticipatory type, more space will be given to illustrating it.

Again we quote from Bagley,[1] who gives a lesson whose problem is to determine deductively what the climate of the Andes Mountains probably is.

"(1) **The Data.**—These are the facts with which we

[1] *Educative Process*, pp. 308-9.

start. Taking the lesson on the climate of the Andes region as an example, it is clear that a study of the map will reveal certain salient facts concerning the position and extent of this region which may be brought out by questioning: What is the general direction of the Andes system? Between what parallels of latitude? What zones are represented in this extent? Where is the highland the widest? Approximately how wide at this point? Where narrowest? Compare the eastern and western slopes. Are the valleys high or low? Narrow or broad? What do we term a high, broad valley?

Having completed this preliminary map study, the next step will be to impress other data that are essential to a study of the climate. The altitude of the principal ridges and plateaus may be told by the teacher or gathered from text-books or sources. Having these various *facts* in mind, the next step will be to review the—

Principles.—What four general conditions govern climate? (Latitude, altitude, distance from the sea, prevailing winds.) What is the general effect of latitude upon climate? Of altitude? In what ratio does increase in altitude lower the temperature? (Approximately 3° for every 1,000 feet.) How does the neighborhood of large bodies of water affect climate? Under what conditions? What are the prevailing winds in the equatorial region? How do they vary with the seasons? What are the prevailing winds in the temperate zones? How do they vary with the seasons?

(2) The Inference.—According to latitude, what climatic zones would you expect to find in this region? How will altitude affect these conclusions? If the temperature at the sea level on the equator is 98°, what will be the temperature at an altitude of 10,000 feet? 20,000 feet? 5,000 feet? How high are the plateaus in the northern

Andes? What, then, will be their climate, according to latitude and altitude? In what respect will the prevailing winds modify the temperature of this region? etc.

The temperature of the central and southern portions of the region may then be inferred from similar data. Rainfall will probably be left for another lesson, but it may be inferred from an application of the same principles.

(3) **The Verification.**—The inferences having been placed in tabular form upon the blackboard, the pupils may then be encouraged to go to the text-books, encyclopedias, and other sources for empirical evidence that will support or controvert the conclusions. In some cases the deductive inferences may be found not to tally with the facts. It will then be necessary to search out the causes of the discrepancies. When all disputed points have been cleared up, the tabulated inferences may be modified to meet the facts, and recorded in permanent form in the pupils' note-books."

De Garmo[1] says: "*Literature* offers a good field for the exercise of the anticipatory judgment, since it is supposed to represent events and results not so much as they are or were but as they might have been or ought to be. In such matters the student may well have a chance to try his ingenuity and his ethical insight. Any literary work offers opportunities for such experiments, either by supposing a change in some essential part, or by varying the time and the place which furnish the setting for the piece, or, even without any such change, by supposing a different result to follow from the given combination of circumstances. What, for example, would have been the effect on the outcome of *The Merchant of Venice* had Shylock yielded to Portia's plea for mercy and had bid her destroy the bond? What, if the judge had condemned him to death? What, if the

[1] *Principles of Secondary Instruction*, Vol. 2, pp. 127-8.

Prince of Morocco had chosen the right casket? Could Portia have extricated herself from her painful position as skilfully as she did Antonio from his? Can you suggest a better plan for Bassanio to get rid of his debts than to marry a rich wife? What would the modern woman have said when Bassanio chose the leaden casket? In short, in literary study the student should not be denied the use of that power which Hamlet exercised when he exclaimed, 'Oh, my prophetic soul, my uncle!'"

The same method can be used in *history*. A student writes of a lesson recently taught as follows:

"A class studying *history* is able to 'predict' events from comparison of the various causal conditions. For example, in the study of English history I have brought to the attention of the class the facts of the numerous inventions following 1760, and have asked what effect that must, of necessity, have had upon industry. They have been able to see that it must have had the effect of greatly stimulating manufacturing. Then to the question of the further influence it must have had upon population and methods of living, they have shown that manufacturing would draw people to towns, which would most likely be located in the regions of coal and iron. And still a further result that can be inferred, provided the students are informed about the matter of representation in Parliament, is the political effect of all this transfer of population from rural life to thickly settled cities and towns. All of these conclusions can be reached by the students in response to some questioning by the teacher, and in advance of any reading."

History is full of such cases. When students know that prior to 1756, England and France are strong rivals in colonial aggrandisement; that on the borders are wild, half-savage pioneers whose passions are with difficulty kept in leash; that England's national life and that of the American colonists is more robust; that the strategic points for holding the empire claimed are Quebec, Du Quesne, Montreal, and Louisburg in America, and so forth, they can make a pretty accurate guess not only as to what will happen but as to what will be the objective points in the campaign and the final outcome.

Composition in foreign languages is of the anticipatory type. The sentence, *Cæsar pursued the enemy beyond the farthest outposts of the frontier,* when being translated, makes the pupil take the anticipatory attitude. For he says in effect, what will be the Latin form for Cæsar, for pursued, etc.? This may not be very interesting to some students, but it possesses all the ear-marks of the type.

Invention in *English Composition* is of the same type. I remember a simple composition exercise that created a vivid interest in a seventh grade class, which ran like this: A boy was going past the home of a very crusty old man who was noted for his antipathy to boys and who had a number of valuable pigeons, at that moment perched on the roof of an outbuilding near the street. The boy picked up a stone, threw it at the flock, and hit one of them, which fell off on the ground. The boy looked startled, started to run, thought better of it, walked up to the old man's door, and knocked. He went in, in a few minutes came out, and went off down the street, whistling, with the pigeon in his hand. Problem: What happened in the house?

In *Arithmetic,* among other forms of this type, pupils may be asked to make up practical percentage problems in connection with their own home activities. This may be varied for all the operations of the subject. This is anticipatory in type, because, knowing the principles involved, they look for particular cases to which they apply.

Section 4. Relation of Induction to Deduction

The Two Always Together.—While we have distinguished induction from deduction in the last two chapters, it is necessary to bear in mind that in every act of thought both are present. This may seem to be either impossible or a complete annulment of much that has been asserted in the last two chapters. But an illustration will make the point clear:

A voter asserted and believed that an honest man would be efficient in public office. He accordingly voted for and helped elect William Smith, an honest man. This is deduction. Because he says, in effect:

> Honest men make efficient public servants.
> William Smith is honest.
> Therefore he will be an efficient public servant.

But he finds that the office is mismanaged. He investigates Mr. Smith's administration and finds that while he is honest he is not shrewd, and so was deceived by dishonest but cunning politicians. He therefore modifies his general principles—makes a modified induction, so to speak, to the effect that honest and intelligent men make efficient public servants. Here we have in the verifying phase of the deduction the formation of a slightly different induction.

Suppose, on the other hand, his nominee has proved efficient; he would still have modified his generalization by making it stronger, since when applied to one more case it still held.

A boy in school learns to write. He has formed certain habits which apply to a particular letter every time he is called upon to make it. He makes the letter *a* always in the same way. This is a sort of deduction. But he does not make it in exactly the same way. Perhaps because he changes from pencil to pen, perhaps because he uses different sorts of paper at different times, or perhaps because of varying rates of speed, he modifies his way of making the letter; in fact, he is certain to do so, as anyone can prove who has copies of the handwriting he wrote from year to year. In other words, constant deductions or applications to particular cases modify his general method.

When the theory of evolution was first enunciated it was made to apply to biology. Later it was applied to history, sociology, psychology, religion, education — all cases of deduction. But in so doing the nature of the first generalization was materially modified. The young teacher leaving the training school has a system of principles which she applies from day to day to the particular problems of the school room. In a year these principles have been modified and changed in spirit, content, and vitality by the process of application.

On the other hand, when I make the induction: amount of interest = base, rate, time, for the examination of several problems, as:

Interest on	$100	for 2 yrs.	at 6%	=	$12.00
Interest on	75	for 4 yrs.	at 5%	=	15.00
Interest on	120	for ½ yr.	at 4%	=	2.40
Interest on	60	for ⅓ yr.	at 6%	=	1.20

I am making deductions constantly. The answer to each of these problems is based on induction — that we have to multiply, reduce percentage, etc., in each.

Explicit vs. Implicit Elements.—Consequently when we are making inductions we are using deduction, and when we make deductions we are perfecting induction. The only basis upon which we are justified in saying that this is an inductive lesson and this a deductive, is that when induction is *explicit* and deduction *implicit* it is an inductive lesson, and when deduction is explicit and induction implicit we have a deductive lesson. For it depends upon what is in the focus of attention. If we are *thinking* about getting a rule from particulars and are not paying attention to deducing rules, we are learning an inductive lesson. But if we are thinking about, have in the focus of attention the application of a rule to a particular case, and are not thinking of the effect of the application upon the rule, we have deduction.

Thus it is possible to say that induction and deduction go on at the same time and still be able to say this is a deductive lesson and this inductive.

References for Class Reading

Bagley, *Educative Process,* pp. 305-315.

Bolton, *Principles of Education,* pp. 630-632.

De Garmo, *Principles of Secondary Education,* Vol. II, pp. 122-149.

Dewey, *How We Think,* pp. 74-100.

Sutherland, *The Teaching of Geography,* pp. 155-159

Thorndike, *Principles of Teaching,* pp. 160-164.

Exercises

1. Give five examples of the brightest cases of practical deductions of which you know.

2. Throw the five foregoing examples into syllogistic form.

3. What is the problem in induction? In deduction?

4. What is the difference in one's attitude toward the generalization sought in induction used in deduction?

5. Give two good examples of narrowing down the field of deduction from three to four to one inference by eliminating the impossible.

6. How are the explanatory and the anticipatory types illustrated in contrast in

a) Latin composition,
b) weather reports,
c) life insurance tables,
d) in arithmetic,
e) in hygiene,
f) in literature?

Illustrate in each case by *particular* examples.

CHAPTER XXI

THE UTILIZATION OF PAST EXPERIENCE

SECTION 1. THE OLD AND THE NEW

Principle.—Each new method of control is composed of elements and modifications of old methods of control. The new method is a reorganization of past experience. The act of skating is composed of several actions already learned, such as balancing and stroking out with one foot, then the other. Shooting a rifle brings about co-ordinations of many muscles which have been previously learned. The drunken sot who reforms is compelled to make the best of a set of inadequate moral habits, and can never hope to do well the things he wishes to do. Multiplication consists of addition plus the memory of certain groups of figures. Twenty-eight times 27 consists of adding 27 eight times and twice remembering that the second group are tens. All of these were known before they were combined. This principle takes many forms in educational literature.

Apperception.—The most commonly used form of the principle is called apperception. The Herbartians, who have given the term its widest currency, use it chiefly in connection with the acquiring of new ideas. McMurry,[1] for instance, says: "Appreciation may be roughly defined at first as the process of acquiring new ideas by the aid of old ideas already in the mind." Neglecting a faulty psychology which considers the new ideas as something external to the

[1] *Elements of General Method*, p. 257.

mind—as strangers before a city—and stating the conception in a better way, Bagley[1] says: "The 'raw materials' of experience are the elementary processes of consciousness—sensation and affection. The making of these processes in their combinations significant—the reading of 'meaning' into them—is technically termed 'apperception.' Sensations that inform of the environment are interpreted not according to their intrinsic nature, but according to their reference to the *needs* of the organism."

Everything has the meaning which past experience puts into it. The sentence: Job's wife said, "Curse God, and die," means to the reader a combination of meanings of individual words. Each word's meaning determines in part the meaning of the whole. He to whom the meaning of God is that of a just, all-powerful, splendid and awful individual, would get a quite different meaning of the whole than would one who thought of God as a being who was deposed and reinstated upon the whim of man.

Children's errors in the use of words are a perennial source of humor, but they show the all-pervasiveness of the principle. When Johnnie sings, "The consecrated cross-eyed bear," when Isaac in the Ghetto sings, "We shall come from Joisey bringing in the cheese," they are using not wisely but well the principle of apperception—giving significance to words out of the fulness of their experience. Ideas are gained by the reorganization of what is in experience already. And since ideas are merely symbols for methods of control, apperception is the expression of the principle laid down in the opening sentence of the chapter.

Attitudes.—The principle may be illustrated from attitudes. People of a certain "set" of mind see events in the light of their individual biases. The occupational bias illus-

[1] *Educative Process*, pp. 81 and 82.

trates this well. The artist, the engineer, and the geologist viewing Niagara Falls give it a quite different meaning because their attitudes to everything in life are different. The artist will see lines and colors, the engineers will dwell upon horsepowers and turbines, while the geologist will think in terms of rocks and geologic ages. Temperamental attitudes, such as the emotional, the intellectual, and the motor, produce different meanings. One of each type may see a mutilated animal on the street. To the emotional the spectacle is one of sadness, to the intellectual it is one of query and speculation, and to the motile it is a case of action. Each reacts according to his habitual mode of viewing life.

Necessity for Review.—Since the foregoing is true, past experience is always in use, both in school and out. But there are certain occasions during the recitation where it is necessary, or desirable, for the teacher to have an *explicit* review of certain facts and activities that the pupils have previously experienced. Frequently it is not necessary for the teacher to review past experience with the class, because it will come up of its own accord. But, on the other hand, just as frequently there must be review. This is necessary, because, even though these data may be stored away somewhere in experience, they are not, simply because of that fact, absolutely sure to be recalled. They may be tucked away in some outer zone of attention, and the appropriate association may be lacking to recall them to the focus of attention when they are needed. They need to be recalled, revived in consciousness, by the teacher in class.

Relevant Past Experience.—It might seem unnecessary to state that the past experience reviewed by the teacher should be relevant to the problem under consideration. It is a matter of simple economy of time and intellectual effort to confine the review within those limits. And yet teachers, through neglect or the desire to have some review of past experience because a theory calls for it, often fail to select facts and situations for review which have any logical connection with the problem in hand.

Two illustrations will suffice. A teacher who conceived the function of *Crossing the Bar* to be "To describe a desire for a peaceful death" (the correctness of this being immaterial, since we are concerned with the relevancy of his review of past experience) gave the following questions in review of the pupils' past experience: "Have any of you ever seen a harbor? Describe it. Show some pictures of a harbor. Describe the tides at the coming in and going out of a ship." This was the whole of the review. To be sure, the terms "harbor" and "tide" are used in the selection, and to that extent there is relevancy. But *the* relevant past experience, as determined by its logical connection with the essential features of the poem, would deal with ideas about death, or a review of Tennyson's life, showing how *à propos* of the closing scenes and emotions of his life the poem is. Again, another teacher dealing with this same poem did review Tennyson's life, but in the following manner: "When was Tennyson born? When did he die? What were his chief works? What other of his poems have you read?" Good facts, to be sure, but what is their relevancy to this poem any more than to any other of his poems? How do they prepare the way for a better understanding or appreciation of the problem he was trying to solve? In order to make this review valuable, those facts, and those only, which show the poem's force and naturalness, should be reviewed.

Section 2. Review for Motive

Motive Found by Reviews.—One reason for a review of past experiences is to secure a *motive* for the study of the lesson in hand. Sometimes immediate interest supplies the motive, without the necessity for any review. For instance, in the study of poems the teacher under some circumstances can secure the motive by the mere question, "What is the problem the author is discussing here?" But under other conditions a review of past experience is necessary. For if subject-matter provides the means for the control of values, generic or specific, it frequently happens that the values to be controlled have not been in the focus of the children's attention for some time, and hence may not be appreciated as highly as they otherwise might. Then it becomes necessary to bring them in and to create the conscious lack of control.

Illustrations.—For instance, in teaching the rule for divisibility by three for the sake of speed in computing, it may be advisable to give the children a series of problems in which they *work for speed*. Then the teacher leads them to see that they are not sufficiently speedy. The rule then follows.

Or, again, in the situation cited above, the study of *Crossing the Bar,* if immediate interest is not sufficient, a review of the author's life, showing his personal characteristics pertinent to the setting of the poem, may be made, and the question put, "How do you think such a man would view death?" Or, students old enough to have had thoughts about death may be questioned as to their opinion upon the subject, and then the statement may be made, "In the poem to be studied, Tennyson tells what he thinks death will be like."

Again, in American history, if the value to be controlled be to see how a strong centralized government grew out of the needs of strong local governments, it may be necessary in beginning *each* lesson to go back to this value and to have it restated so that it may be kept clearly in mind. The condition in which the problem was left at the last lesson, the new factors entering in at this lesson, and the new form which the problem takes because of these, may need to be reviewed in order to make the motive for studying this lesson as active as possible.

Section 3. Review as an Aid in Solution

It is necessary, also, to review past experience in order to bring to mind data that are essential for the *solution* of the problem raised at the beginning of the lesson. For here again the data may be forgotten, or may never have been known. In this the teacher may save the pupils much loss of time by explicitly bringing the needed data into the focus and thus obviate the necessity of searching for them.

In this connection two remarks are necessary. In the *first* place this searching is good exercise for pupils under some circumstances. When the material may be recalled by the vigorous use of memory, the teacher who *assists* the pupils to recall it is taking away from them a much needed means of growth. Such efforts at recall make for self-reliance and strength. Or, if the material may be found in books easily, the children should be required to find it. In the *second* place, it is a mistake to develop too much introductory material in any lesson. That is to say, the solution of the new problem should be near enough to the past experience of the child to make unnecessary the introduction of much new data. Long introductions tire the pupil before he comes to the real work. For instance, the phrasing of grammatical rules should not require the development of many words which are foreign to the pupil's vocabulary. If the rule must be stated in these words, it should not be taught until the pupils have sufficient breadth of scholarship to have met the words in other connections.

Illustrations.—A few examples will indicate some situations in which this review is advantageous. In the problem, How large will we have to make a bin in order to hold a ton of coal? it may be necessary to review the relation of pounds to volume in connection with coal. If the pupils *ought* to know it, or if they can easily find it for themselves in their arithmetic, this will not be advisable. In solving the fodder problems given earlier, the teacher may find it necessary to make an explanation of the devices used in the tables for tabulating the information. In the study of literature the teacher often finds it necessary to recall the meanings of words which have been previously studied. The cases where such reviews are advisable are multitudinous in the course of every day's work.

Section 4. Review for Functional Connection

In Chapter XXIII the question of application will be discussed. Without anticipating this later discussion, the following statement will set the problem of this section more clearly before us. When the solution of the problem has been reached it is advisable to apply it to other problems of the same type. This is true because each solution is an instrument created for a specific purpose but usable in certain other situations. The more varied the uses to which it is put, the better will be the grasp upon it.

Now its use or purpose may be exemplified in two places, either when the problem is raised or when the solution has been reached. For instance, it has been said repeatedly that one way of securing a motive is to create a breakdown in control, for then the pupils will see the purpose of the lesson to be studied. At that point functional connection is made with past experience. But frequently the teacher is able to secure the motive by an appeal to immediate interest, and then functional connection may not be made at the outset. In this case the method of control worked out may still be used in other situations after it has been learned. Indeed, even when the functional connection is made at the outset, other applications may be made later. But in every case this connection serves as a means for recalling past experience, and in so far as the teacher intends it to be for that purpose it is germane to the discussion of this chapter.

Illustrations.—Whether the pupils learn the rule for divisibility by three because they feel the need of speed for controlling certain generic values or because of immediate interest, in either case, after the rule has been learned, it serves as a means for reviewing past experience when it is applied to work which the children have already been doing by the slower method. Again, if the *Psalm of Life* is studied because of immediate interest, the ideas the pupils have had previously may be called up when applications are made. In studying physics, even when no attempt has been made to provide a motive for study other than those used in connections with all subjects, after any principle has been studied, frequent and wide application may be made to problems that lie within the everyday experience of the students. Similarly, in the study of history, even when no attempt is made to strengthen the motive, application of the principles discovered will serve as a means for calling up past experience.

Section 5. Review of the Previous Lesson

Under some circumstances the teacher may feel the need for reviewing the previous day's lesson before beginning the new lesson. This is done wherever drill is necessary in order to fix the facts in mind. It is also done when the new lesson grows out of the old lesson. Such review is probably not necessary when short poems in literature are being studied, and when in such case the poems are not studied for the facts they contain. Each poem being an isolated unit, it may have no functional connection with succeeding units. Likewise, it will not be necessary when pupils are drilled for a number of days in an arithmetical process. For each succeeding day continues the drill, and the whole "new" lesson is a review of the previous day's lesson.

The Time for Review.—A simple matter of mechanics is involved in answering this question. Should the reviews of past experience be at the beginning, the end, or the middle of the recitation? To facilitate the discussion the reader is asked to glance at Chapter XIX and to observe that the recitation may be divided into Preparation, Development, and Application. Now, review for the sake of motive must, of course, occur in the Preparation. The review of the previous day's lesson usually occurs at the very beginning of the Preparation. Review for functional connection occurs usually in the Application, but may occur in the Development. Review for assistance in solution is sometimes put in the Preparation, sometimes at the beginning of Development as an introductory step, and sometimes is introduced wherever it is needed in the Development. It seems advisable to exclude it from the Preparation. But where in the Development it should be placed is a matter of individual preference. Some teachers prefer to clear the ground before beginning the solution; others claim that this procedure gives too much preliminary assistance and indicates too obviously the direction which attempts at solution should take. The experienced teacher who has a mastery of the technique of teaching depends largely upon his feeling of the fitness of the time and place.

References for Class Reading

Bagley, *Educative Process*, pp. 83-94.
Bolton, *Principles of Education*, pp. 520-4, 529-551.
McMurry, *Method of Recitation*, pp. 255-297.
Thorndike, *Principles of Teaching*, pp. 42-50.

Exercises

1. Give five humorous examples of faulty apperception.
2. Give five examples of particularly clever apperception from your own experience or reading.
3. Show how one's attitude toward an object of investigation determines in great part what one sees in it.
4. Give ten good examples of review for motive, using school work as far as possible.
5. Give five examples of faulty review.
6. Show how you would improve them.
7. Should such reviews be long or short? Why?
8. Give five examples of where it was necessary to review some points in order to finish a solution.
9. Should all this review come in at the very outset or as needed? Illustrate.
10. What is meant by "review for functional connection"? Illustrate it. Is it a practical thing? Why?

CHAPTER XXII

METHODS OF SECURING REALNESS

If we were able to follow the child *in toto* and solve only those problems for him which arise without our manipulation, there would be little need for trying to make situations real. But in the ordinary course of school work, with subject-matter to be presented to the pupils, very frequently great care has to be taken to assure the realness of the problems which are to be attacked and of the solutions which are to be arrived at. Under these conditions some discussion of the methods by which realness and vividness may be given to the subject-matter is in place.

Too much covered.—It may be laid down as a general proposition that too much work is covered in most courses in school. This does not mean that children are overworked, but refers to the fact that school work is not sufficiently intensive. For instance, in English History, if, instead of covering all the history in skeleton form, a few epochs were studied intensively and the intervening periods omitted, the students would be better prepared to participate in modern life.

Unless this is done, the skeletonized accounts in history and the abstract processes in other subjects have little meaning and little bearing upon practical conduct. The criticisms of business men upon the mathematical inability of graduates of the public schools is in large part due to the fact that school processes are gone over so rapidly that they are not built up vitally in the minds of the children.

Type lessons.—One method of securing this richness of detail is the type lesson in which one typical case of a large group is worked out in detail as a basis for the understanding of all. McMurry has worked this out in excellent form, references to which are given at the end of the chapter.

Problems.—One method very frequently discussed is that of making the problem solved by the subject-matter the problem of the pupils. It requires the teacher to search the experience of the child to find things of value in the control of which a breakdown can be made to occur, such that the subject-matter will appear as the remedy. This does not require further elaboration at this point.

Imagination.—Of the other aids to realness imagination and comparison are chief in importance. (In treating imagination no function of the image except that of making situations more real and vivid will be discussed.)

The average man does better and more intelligent work, and has clearer and more intelligent opinions upon his own work than upon that of any other individual. The reason for this is that in his own case he has the facts, the ideas, feelings, etc., with all their associations, at first hand, and easily within his observation; while in thinking upon the plans and work of other people he has to build up in imagination the situation which their work is supposed to involve.

It is also generally conceded that any one can do intelligent work in other than his own actual conditions in proportion to the truth, clearness, and vividness with which he can build up these other conditions, in his imagination. The Englishman can give better advice to another Englishman than to a Chinaman. A man is better able to understand other men than he is to understand women. And this for the reason that he can put himself into the exact situation of the person to be understood in the one case better than in the other.

In school the child is sometimes by necessity removed from the actual situations which he studies. It is impossible for him to live in Athens with Pericles or in Rome with Augustus Cæsar. In studying arithmetic he cannot be the grocer, or the banker. In literature he cannot be Macbeth or Hamlet. Because he is removed from the real situation he cannot do as intelligent work as if the conditions were actual. And hence the immense importance of making the situations which he studies, be they historical, arithmetical, or literary as real as possible through imagination.

And, indeed, the child is more capable of such imaginative work than is the adult. He is just emerging in the grades from the world in which he actually has to learn to distinguish the real from the imaginary, and without great effort he can be led to reconstruct the historical situation with a good deal of vividness and more or less correctness. In arithmetic, it is not hard for him to imagine himself to be a banker charging interest and floating stock companies, providing the teacher does his part in supplying inspiration and aids.

The aids which the teacher has at hand to assist are of four sorts. *First,* there is comparison of the imagined situation with the pupil's own experiences, secured by first of all advising the pupils to imagine themselves to be in the situation, and then describing it by similarity and contrast with that with which the teacher knows the children are familiar.

Second, there are material models, specimens, etc. In illustrating history we may have the actual instruments and clothing used by the people. We may have specimens of work that they did and of the things that they built. When we cannot have these, we may have models of them, models of Grecian houses, models of fortifications, etc. The sand table, well utilized, is one of the best instruments at the teacher's disposal (in some cases even as high as the eighth grade) for making the situation real.

Third, he may utilize pictures, diagrams, maps, and blackboards. Pictures are of great service in geography; diagrams may be used to advantage in arithmetic. It is impossible to teach campaigns in history without the use of maps. (The use of the blackboard is reserved for a separate treatment.) These all in their way tend to make the situation real. Indeed, pictures and models are often better than the actual situation because they center the attention upon the important points, while in the actual situation the attention may not be so centered.

Fourth, another aid to the teacher is dramatization. This is probably the greatest aid to the imagination. Pictures assist somewhat, maps assist in their degree, specimens are useful, models give contour, but dramatization gives all these and more. These other aids lack action. They are dead. The imagination has to make them live. Dramatizing a banking house, a grocery store, William Penn and the Indians, gives life and force to what knowledge the pupil has. Dramatization assists the imagination most effectively and forms a better skeleton around which the imagination may put the flesh of real life.

Dramatization.—The advantages of dramatization are, *first,* as just said, that it makes the situation very real, and *second,* that it gets the child into the habit of seeing things vividly, so that the imagination has through it a high standard set which it will in the absence of dramatization seek to reach. That is to say, if in early life the child has dramatized much he will get into the habit of imagining things clearly, and in the higher grades, in the high school and in later life, when a situation is put before him meagerly without the vivid dramatic element present, his imagination will have a tendency not to rest content, not to feel comfortable, until the situation has been brought up to the high standard of reality to which it has been accustomed.

There is always a question for the teacher as to the amount of dramatization that ought to be used in the school. Part of the question can be eliminated if we remember that the chief reason for the use of dramatization is its capacity for making a situation real. Dramatization, as mere dramatization, ought to occupy a very small space in school life. Therefore, unless it is brought into line with the problems of the lesson and used as an aid in making them real, it should be rigidly excluded. In the case of valuable dramatization the question remains as to how much there should be in the first grade, and how much should be in the eighth grade. The only light that can be thrown upon the question comes from the fact that in the recitation the child is trying to do something, and that dramatization will assist his imagination to make it more real. Therefore, where the subject-matter needs many aids to make it concrete, or where the child is better able to deal with concrete as over against abstract situations, the dramatization should be used to the greatest extent. Seemingly it is most at home in the earliest grades, for the child is living in the world of imagination; he thinks concretely and thinks naturally in dramatic form. But in the eighth grade, after a long course of training in taking symbols and making them real by means of the aids already mentioned, he ought to be able to get along with less dramatization, with less verbal description than in the earlier grades. If he is able to realize the situation without the aid of any of these props it is better for him to do so, and if he *can* do it, it indicates that his imagination has grown strong and effective.

Blackboards.—A separate chapter might be devoted to the use of the blackboard in making situations real. It seems almost as though student teachers were afraid that the blackboard might be worn out or that chalk was expensive. Because of their recognized value, blackboards are put in at great expense by school boards and given a prominent place in the recitation room often to be little utilized by the teacher. If a word is not correctly pronounced or if a new word is met, does the student teacher write it on the board? Rarely. If a sentence in history needs explanation and could be explained by a diagram of three lines on the board, would the inexperienced teacher use it? Rarely. He prefers to spend a minute trying to give a hazy idea and even then probably fails. If a difficult lesson is to be developed does the young teacher put the main topics on the board to assist in the summary? Seldom. One would think that the board would be used a great deal in geography, but it is not.

This is an extreme statement. Conditions are not quite so bad as this; but they are bad. When one thinks of the increased ease with which so many pupils *see* relations; of the value our outlines are to ourselves, of the fact that many people think best when they *see* what they are thinking about, it makes him wonder why the blackboard is so little used.

It has been said by some that the blackboard should show at the end of the lesson an epitome of all that has been developed in the recitation. This is extreme, and cannot always be done, especially in such subjects as drawing, manual training, music, and, perhaps, reading. And it need not always be true in the case of geography, history, or arithmetic. The *end* is not the utilization of the blackboard, but the making of the subject-matter clear and real, and if this can be secured most economically without the blackboard there is no reason for using it. But the lessons in which facts are to be collected and organized are few in number where the points should not be written on the board as they are made, or before the end of the lesson. And, moreover, there are very few lessons of any sort which cannot be gotten under better control by the children through the liberal use of this instrument.

Experience.—It has been constantly implied and should now be definitely stated that the material upon which these instruments are used is the past experience. In dramatization, and in the use of pictures, models and specimens, the thing that is being operated upon is the past experience of the child. If I speak in a farming community I use one sort of instrument appealing to the past experience of that group; with city audiences another instrument is used to tap other past experiences. And teachers often fail in making the situation real because the illustrations they prepare so carefully are above the heads or beyond the experience of their pupils. It is the inalienable right of every child to have the educational gospel presented to him in his own tongue.

Comparison.—Comparison, the other psychological process to be discussed, has two sorts of values. In the *first place,* it aids the teacher in making situations clear and vivid, as has been said. The pupil draws from his past experience things similar to those in the situation. For instance, in trying to get a true picture of Wordsworth's *Fiddler* the pupils are aided materially by being referred, on the one hand, to their own experience with fiddlers on the street, and on the other hand, to the influence of music upon other people, as shown in Browning's *Saul,* and Dryden's *Alexander's Feast.*

This comparison is sometimes called illustration, and sometimes analogy. But of whatever sort, it is of paramount importance in getting hold of situations in the sense indicated above. The convincing speaker is frequently one with convincing powers of comparison. The teacher has a broader influence, and can get better results if he has telling comparisons by which to make his explanations understandable.

The *second* value that comparisons have (to be discussed more fully in the next chapter) may be called comparisons of application. That is to say, after a solution has been reached the process of comparison makes it possible for us to observe relations with other problems so that we may apply the solution to other similar situations. In history, after we have treated of a problem of the ancients, it is legitimate and valuable to refer the problem and its solution to modern life to see if we can find the problem still with us, to find in what respects it differs in form and to what extent the solution of the ancients will fit our conditions.

References for Class Reading

Adams, *Illustration and Exposition in Teaching,* pp. 250-274, 317-335, 354-390.

Dopp, *The Place of Industries in Education,* pp. 192-242.

McMurry, *The Method of the Recitation,* pp. 246-256.

McMurry, *Special Method in Geography,* pp. 11-13, 17-19 and 55-75.

Exercises

1. Is the amount of work to be covered in a year a matter of scientific investigation or of convention? If the latter,

is it absolutely necessary to cover all the work in a course of study? Why?

2. What are the merits of a few topics covered intensively as against an extensive field covered rapidly? What are its disadvantages?

3. Give illustrations to show how the following have made lessons clearer.

1. Diagrams.
2. Pictures.
3. Stories.
4. Comparisons with events in the pupils' own lives.

4. What are the chief objections to dramatization?

5. Give one example of an observed case in which dramatization was a failure with a class.

6. Give five in which it was a success. Show why it was a success.

7. Give two cases of poor use of blackboard.

8. How would you have improved it?

9. Give five examples in which a speaker or teacher failed because he did not clothe his ideas in the language of his audience.

10. Name ten selections in literature that could not be made real to pupils because they were not within the experience of the children to whom they were taught.

CHAPTER XXIII

THE USE OF SUBJECT-MATTER

Section I. Subject-matter as an Instrument

To *understand how* to use subject-matter, such understanding as has been provided for in the foregoing chapters, does not of necessity imply *skill in use.* We have studied how to make rules and definitions, and solve problems. But efficient control is not identical with an understanding of how the control is to be secured. Skill and understanding are different. A boy may know how to handle all the processes of arithmetic if time is given him, but unless he has skill in manipulation he cannot be said to have efficient control A girl may have enough training in sewing to construct stitches and draught patterns, but this is not sufficient control unless it is skillful control.

Value of Skill.—Differences in degrees of skill index the differences between grades of men. When competition is so keen and men are so plentiful, the margin that separates success from defeat is a very narrow one, and that margin is usually secured by a slight superiority in skill. In running, the victory goes ordinarily to the one who is best trained, and most skillful in the devices of the art, and usually the margin between one contestant and another is small. In teaching as well as in the other professions and in business, skill gives one man precedence over another. It has become a trite saying, and therefore an important one, that it does not matter so much what a man can do as how well he can do it. The quickness, the dispatch, the exactness with which he can do a thing must be added to the fact that he can do it at all. Many men can perform surgical operations, but the man who is the greatest success in surgery is the one who can perform them with the most skill. Many men can play baseball; but the only man who stands out as a success in baseball playing is the one who can play with consummate skill. It would seem, therefore, that skill, in the close competition of life, is absolutely necessary.

Skill is partly a matter of judgment and partly a matter of habit. In either case it is dependent upon practice and repetition. The advantages of habit, therefore, are advantages that may be claimed for skill. Of these three important ones may be mentioned.

First, by making a rule or method habitual through proper repetition, accuracy is secured. The memorized multiplication fact, the word spelled without thought upon it, as the pen slips over the paper, the steady foot of the structural-iron worker busy with thoughts far removed from his perilous position, the experienced engineer at the throttle, the pupil in whom linguistic conventions have been thoroughly grounded, are all more accurate in their movements than they were before they had acquired skill.

Second, skilled action is more rapid. The little pupil has laboriously to concentrate on the formation of the letters of the alphabet, writing ten letters per minute; with practice he may ordinarily write two hundred letters a minute. A similar increase in rapidity is seen in all of the subjects studied in school and in all practices pursued outside.

Third, an important result that comes from increasing skill is increasing satisfaction, sturdiness and pleasure. The explanation of the independence and self-reliance of the skilled workman, in comparison with the unskilled laborer is due in large measure to the fact that the former has a pride in his skill and a pleasure in recognizing it that makes him feel his independence and cherish his individuality. Frequently, the joy that follows the recognition of skill in some one thing so permeates a boy's life that the influence is felt in toning up his whole working system, waking in him day-dreams and air-castles built upon the basis of his best ambitions.

Standards of Skill.—Outside school there is only one standard—that of absolute efficiency. But in school the standard is influenced wisely and humanly by differences in capacity. These differences are of two sorts, genetic and individual.

Standards vary genetically; that is, there is one standard of skill for the first grade and a higher standard for the high school senior. Theoretically, the standard for each is the best of which pupils of the grade are capable. Practically, in applying this standard, there are two difficulties. In the *first* place, normal standards have not been worked out for the different grades. We do not know exactly what amount of skill to expect of third, fourth or fifth grade children. Consequently, the teacher who wishes to get the best out of his pupils may easily overestimate or underestimate their maximum efficiency. In the *second* place, standards in the same grade may be different upon different occasions. For instance, a *formal* letter written by a sixth grade pupil is expected to be done with a maximum of neatness and care for grammatical and orthographic details; but *notes* taken hurriedly in preparation for a theme cannot be as neat without slowing up the thought processes. It is an important point to determine just what standards should be maintained in exercise books. Slovenliness must not be allowed, extreme neatness and care for form may hinder the mastery of the content studied. Desirable as these standards are, they have not been worked out fully and the teacher has to do the best he can for himself. However, rapid progress is being made in securing some of these standards, as, for instance, in arithmetic by Stone and Courtis, in handwriting by Thorndike and Ayres, and in high school composition by Thorndike and Hillegas.

In the *second* place, the school cannot hold all pupils to the same immediate standards without discouraging those pupils who are slow and inexpert. The best that each pupil can do forms the immediate standard. The normal standard for the grade will not work for the pupils either above or below it except for promotion. For the bright boy must be held to his best and the slow student must likewise be judged by his maximum. What is each pupil's best can be determined only by the teacher with the pupils before him.

How standards may be raised.—Sometimes a teacher takes charge of classes that do not have good standards of skill and is confronted with the problem of raising their ideals of strong work. In solving this problem two things will assist. *First,* the teacher, himself, must have standards. He must think about them, and must determine that his pupils are to work toward higher levels of efficiency. Unless a teacher has such standards he cannot hope to increase the efficiency of his pupils. A slovenly teacher always has a slovenly class.

Second, skill must be rewarded. In other words, if pupils are to be led to appreciate skill it must be connected with other values which pupils appreciate. Results that appeal to him should follow. What these results may be depend upon the pupils. Praise from a respected teacher is a good reward. The tremendous saving of time that can be accomplished by increased skill appeals to many students particularly when the thing in which the skill is to be gained is not more than normally interesting. As Rowe says,[1] experimentation should be carried on with individual pupils to find what reward will appeal. Unpleasant results arising from lack of skill can also be visited upon delinquents. This does not mean constant nagging because, after a series of continuous scoldings, the pupil ceases to value the good opinion of the teacher and so will not try to increase his skill to secure what he does not value.

In securing an interest in high standards the teacher, then, has to have such standards himself and must utilize the values which the child appreciates in such a way that he will work for skill in order to secure the control of these. This is a matter of ingenuity rather than of rule and principle.

Section 2. Application

Definition.—Application, as the term implies, is the process of using a method of control which has been learned in connection with one situation in controlling another situation which, while not identical with the first, is essentially the same. A pupil learns addition and multiplication in tables and with abstract figures in school. When he applies these to figuring out the total of a grocery bill consisting of several items he is applying his method of control (addition and multiplication) learned in one situation (in tables and abstractly) to control another situation (totalling a grocery bill), which, while not identical with the form in which addition and multiplication was previously learned, is essentially a case of addition and multiplication.

Its Importance.—There are two reasons which make application necessary. *First,* a principle is never fully under-

[1] *Habit Formation,* pp. 141-6.

stood until it has received frequent applications to concrete cases. "All men are born free and equal" does not mean much if it is only lip-learned. Its essence, its flaws and its power are appreciated only when it is consistently and conscientiously applied to the negro, the servant, the drunkard, the imbecile, and the plutocrat. Percentage is increasingly well understood as it is carried through all its application; interest, discount, commission, taxes, etc. English grammar is not efficiently appreciated till the pupil uses it in all his spoken and written work. Every application of geography to history and literature, to botany and agriculture, to physics and sociology gives a better understanding of the subject.

Second, the chief occupation of life is to handle wisely a series of situations as they arise. Living is just meeting one thing after another. I am writing now, I shall have lunch in a few minutes, then I shall go to the office and dictate one letter after another, I shall select a teacher for a school, buy a Christmas present for a friend, settle what to do with an aching tooth, confer with a friend about school extension and so on indefinitely. These are a few of the things that must be done in an afternoon, and they are typical of every afternoon. Every person has his own series, following along at the rate of one a minute, or maybe, more rapidly than that.

Now, facts, principles and rules are simply and solely devices for handling these particulars. If I have a good system of principles that will take me through each of these with accuracy, rapidity and satisfaction, I am efficient. But if I have a system and am not able to apply them to particular situations it is of little use. I may have a great deal of factual and isolated information but if I cannot use it minute by minute I am only an educated incompetent.

Application is therefore necessary because the application of principles is the chief function and business of intelligence in life. To control each situation by reference to principles is the characteristic of efficiency. To control it empirically, by rule of thumb is the necessary lot of the uneducated. To have principles and not to apply them is the mark of pseudo-education, of one who is an educated performer in a world of words and abstractions but an illiterate worker in the world of concrete activity and feeling.

Application before and after.—The applications are usually thought of as coming after the learning of the principle because it is not possible to apply something that one does not possess.

But there is a very significant sense in which the application of a principle precedes the mastery. In fact, outside of school it is the normal thing, the usual occurrence, to find the necessity for the application of the principle, the chief cause of its study. The clerk wants to keep books better and so he learns the principles and methods of bookkeeping. The farmer wishes to grow more corn, so he studies the principles of corn growing. The housewife wishes to have pretty roses, and studies enough horticulture to serve her purposes. In each case, a person felt the need of being able to apply certain principles to his immediate needs. he saw the necessity for application, he appreciated the advantage to accrue; but he did not have the principles. So, in a very significant sense, the desire to apply principles in these cases formed the motive for the study of the principles.

The customary school procedure is, in the cases cited, to teach bookkeeping and make the application to particular books later, to teach the principles of agriculture, and make applications later upon particular fields, to study horticulture first and raise rose bushes afterwards. This procedure is merely another case of studying the subject-matter for its own sake first and then making applications after it is learned.

But, as previously pointed out in connection with motive, if one can make the pupils feel some other supporting need, much additional interest will be engendered because the concrete case in which he sees the need for the application of a principle as yet unknown is likely to be of greater compelling power than the interest in an as yet unknown principle whose application is not seen.

Illustrations of such are easy to find in any class in which the teacher does not feel that the order of the subject-matter is foreordained. In Chapter XV, in Composition, this method is used all the way through. The pupils wrote and saw that they needed to apply some principle. They studied the principle and then applied it. First was felt the necessity for application of some rule, then the discovery and study of the rule and then its application.

In algebra a problem such as this: A farmer has a seed plot 16x18 feet and wishes to add to its area 144 square feet by enlarging it the same distance each way. In finding the answer to this three new principles had to be taken up—each needed because their application was necessary in order to find the answer. In physics the measurement of water power is introduced because pupils want to know the capacity of an undershot wheel or a turbine. Electricity is studied in order to learn how to fix a door bell. Musical theory is introduced to explain the combinations of piano notes which are pleasant. The theory of light is introduced to explain the method by which light comes from the sun to the earth.

Ordinarily, in most classes the applications are made only after the principles are studied. But as just seen, many cases arise in which the necessity for application can with wisdom precede the study. And then many other applications can be made later. To search for these introductory applications, to make a note of them when they occur in order to use them as soon as possible, are practices which add much to the joy and to the intelligence of teaching.

Illustrations of Application.—There are two types of application. The first and easiest of these to use is the formal application exercise. In arithmetic, following the enunciation of a principle, a series of problems usually occurs differing in detail but similar in type and, therefore, capable of solution by the principle just studied. In grammar, after the definition a series of exercises is given, utilizing the definition. These formal exercises are well known to any teacher or student. To secure the best they should be, as has just been said, as varied as possible within the limits of space and time.

But a much more difficult and more important type of application than the formal exercises is the practical type. In grammar the best application to make is the application to the spoken and written language of the pupils. In arithmetic, problems from the pupils' own intimate experience should be sought for. Particularly in arithmetic, there is a great field for a rural school arithmetic which will carry all its principles in problems dressed in the concepts and concrete experiences of the farm. In physiology, an application of the principles to practical individual and civic sanitation and hygiene is invaluable. In civics, to make the principles and concepts function in the practical political life of the pupils is of more value than mere knowledge of the text-book civics.

This is, of course, very difficult and unfortunately no rule can be laid down for doing work of that kind except this, that the teacher should have an alert eye, open for all possible practical, concrete cases. A note should be made whenever they occur, to be utilized at the appropriate time.

Applications Set by the Pupils.—Not less important is the practice of having the children find situations to which the principle will apply. For in the *first* place, it gives the control of the principle that comes from mastery. To be able to take the principle and handle it gives familiarity therewith and power to utilize. In the *second* place, it makes the pupil independent of the teacher. He becomes in his crude way an original investigator and a disseminator of knowledge. It appeals to his puzzle instinct. His powers are stimulated to search in wider fields. He does not follow, but leads.

In school, the teacher of history may ask his pupils to find cases in history or modern life where the same principle is involved. In arithmetic the pupils may make up problems. In grammar they may collect instances. In geography they may give problems from the environment of the school. And in all such instances a premium should be placed upon originality.

Section 3. Drill

Definition.—Drill is defined by Rowe as the "persistent retraversing in whole or in part of a more or less definite habit-path in order to make it automatic." The essence of drill is intelligent repetition and the standard is automatism such that the item worked upon will carry itself through with a minimum of attention. The difference between drill and application brings out clearly the nature of drill. In the latter the same principle is gone over and over again in exactly the same way, while in application the principle is worked over in a different form in each case. Drill on the table of sixes consists in repeating the table over and over; application problems are of this sort: Find the cost of 24 pencils at 6 cents each, or, if milk is 6 cents a quart what will 12 quarts cost? etc.

Drill vs. Application.—Drill differs from application in that it goes back over the same principle again and again until control is secured in one situation, while application seeks to apply the principle to new situations.

It is claimed by some that drill is not a necessary school process. It is asserted that if the pupil utilizes the principle in new situations, sufficient skill will be secured. For instance, it is said that writing exercises, as such, are not necessary; that if children are taught to form the letters they will become sufficiently expert if they merely write the papers and exercises which are involved in the study of arithmetic, history, or geography. Again, following this principle, drill on the multiplication tables is not necessary; sufficient control comes from working problems involving multiplication.

However plausible this theory may be, it is not true to life. Outside of school, children and adults drill themselves. A boy who has just learned to whistle practices for days to the distraction of all within sound of his efforts. Youths will spend hours by a barnside drilling on a new serve in tennis. Musicians spend years practicing scales. Wherever there is a desire for skill in technique there is a necessity for drill. And the greater the desire, the more strenuous the drill.

So, in school, there is the most urgent necessity for memorizing and drill, for review and rereview. And this stands in the greatest need of being emphasized, for in recent years there is a pernicious tendency afloat in pedagogical literature and practice to the effect that what is needed is that pupils *understand* what they study rather than that they should memorize it. As if there were any antagonism between reason and memory! Why has nature given us memories? And why does the popular mind exalt the man of strong powers of memory? Entirely for the reason that memory has such a tremendous place in life that the recognition of its value has become almost an instinct in the race. The theory that what is needed is not facts stored in the memory, but a knowledge of where to find facts when needed, is harmful. In ninety-nine per cent of the cases our solutions must be worked out in terms of what we know. We have neither time nor opportunity to rush to books before we arrive at a solution. If we waited to do so, the time for acting might be past.

What to Drill.—Speaking in its broadest terms only those things should be drilled which can with advantage be used again and again in an exact form in later life. Notably spelling, reading, writing, grammar, and the essentials of arithmetic are samples. They will be used again and again and they are exact in form: there is one best way to spell, to pronounce, to form letters, to speak, and to multiply and divide.

But in many subjects, not so exact in form, there are *elements* that are of such importance as to be learned in exact and permanent form. For instance, in literature there are many poems, so full of the philosophy of life aptly expressed, that they should be memorized *verbatim*. In history, pivotal dates, events which opened an epoch or in which it culminated need to be fixed permanently.

It is the teacher's business, then, to scan every lesson in order to see if there are in it facts and methods that need to be made automatic. These should be intelligently selected, neither with a prodigal nor a parsimonious hand.

This is not an easy thing always to do. "If a lesson is given in drawing a vase, the habits involved are not so clear at first sight as in a writing lesson. It is evidently a lesson in habit-getting. The teacher wishes the children to get the ability to reproduce objects of that nature. What are the habits? The writer remembers well what an enigma to him as a child was the meaning of a noted illustrator who said, all that was necessary to draw well was to be able to *see*. The boy knew he could see as well as anybody, but he knew equally well that he could not draw. What was meant by seeing in this case? He had not yet observed enough to learn that often square surfaces are not seen as square and, in fact, that forms are seldom seen exactly as they are. He had still to learn that colors are not always what one would think, and that black surfaces with a little light reflecting from them ordinarily must be drawn or represented by white, while white surfaces in the shadow must be proportionately shaded. If, now, he could use these points to just the degree necessary in reproducing objects, he would not only have a general habit of observing accurately, but also one of executing or representing accurately, the object observed. Seeing in the sense used by the illustrator covered, then, all these sorts of activity, and more. When the teacher wishes the children to draw the vase, it may be because that lesson is set by the drawing inspector or supervisor. Little will be accomplished if each child merely makes a drawing, shows it, and hands it in. He will know neither more nor less than he did before and will be only the slightest trifle more accurate and easy with his pencil. If the teacher has a chance to measure by noting the proportionate distances on his pencil, and thus shows the child how to measure for himself—if from several whites, blacks, and grays he matches the light and shadow on the vase, then he will be on the way toward establishing a habit which will help him to be independent of all guessing and to find out for himself whether the vertical lines are really the proper length compared with the horizontal, or where and how much shading is needed. Consequently this lesson, though not contributing much practice, still in getting all the proportions and shades needed will contribute its mite, if we treat it as a habit lesson. It may be a continuation of one begun months before."[1]

Once these candidates for automatic learning have been picked out, however, they should not be left till they are automatic. The states and capitals, the important rivers of continents in order, capes, important commercially or topographically, and many other things of a like sort, should be memorized thoroughly in geography. In history certain dates, lists of the names of administrators of the pupils' native land as the presidents of the United States and the sovereigns of England (for British boys and girls) should be memorized and sung and rhymed if necessary. The multiplication tables and important definitions in grammar should go with the facility of eenie-meenie-minie-mo. Under the old regime everything was memorized; under the new regime we are in danger of memorizing nothing; under the true regime that worth memorizing is selected, but once having been selected it is memorized in thorough-going fashion.

Motive for drill.—There are three sorts of motive for drill. One motive is interest in drill for the fun one can get out of it. This is probably stronger than most writers on methods of teaching will admit and not so strong as most teachers assume. Children do enjoy retraversing something, if it happens to be interesting. They sing ditties over and

[1] Rowe, *Habit Formation*, pp. 102-3.

over again, they ask for the same story, and admit no variations. A boy will recite his spelling lesson with a good deal of interest if he happens to be fairly good in spelling. But there is a good deal of uncertainty about the presence and absence of this interest and it is likely to wane before the process is finally made automatic.

In that case appeal is made to generic values. Certain rewards and punishments of a generic sort are utilized. Perhaps the boy is "kept in" if he does not know his spelling lesson, his tables or his definitions in grammar; perhaps he is graded on his efficiency, or receives a special reward for good work. Emulation in the form of matches may be resorted to, or pride in speed may be engendered.

But appeal may, also, be made to specific motives and should be wherever possible. The function of drill is to give speed and accuracy. If a person wants to be neither accurate nor rapid, the probability is that he will never drill. But if he wants speed or accuracy, particularly speed, and does not have it, he will of course feel the need for drill. In appealing, then, to the specific motive for drill we make the pupil aware of the fact that he is not sufficiently rapid.

Illustrations of this are numerous. A group of pupils intent upon playing a game and adding up their scores to see who is the winner raise a clamor to the teacher for drill in addition to keep the game from standing still. A football team after a stinging defeat "gets down to business," as the coach expresses it. A boy who cannot find out how much it will cost him to make a hotbed because of lack of speed in lumber measures is in a receptive state for drill. Students in high school who have trouble in second-year German because of weakness with grammatical rules feel the need for drill upon the first-year forms.

Teachers, unfortunately, do not make as frequent use of this motive as they should. In Cæsar, the teacher is inclined to blame the first-year teacher instead of recognizing that the tendency of the human mind is to forget, and that an excellent opportunity for a good drill is beautifully exemplified in the failure of the pupils to use the grammar as skillfully as they should. Wherever the teacher of an advanced subject, or of the advanced portion of any subject, gets an opportunity to drive home upon the pupils the fact that they are not proficient in earlier forms he should do so and follow that up with thorough drills and reviews.

Preparatory Drill.—A query arises: Since pupils undertake drill with so much greater spirit when they feel the need for it, ought any drill be given before situations actually arise in which they see the need? It would seem at first glance that the answer would be in the negative. But since the motive is the thing we are after, it is possible to secure it by bringing the students to see that the principle will be used frequently, and that a little drill now will save trouble later. This is true to life. We look ahead and prepare for the future.

Instead of waiting for errors to arise in exercises or for slowness to become evident to the pupils when they apply rules of grammar or tables in arithmetic, the teacher may rely upon what they know from past experiences that drill had better be given now to save time in the long run. But wherever practicable, the pupils should be made aware of poor performance whenever it shows itself.

How to Drill.—Methods of drill are found in psychology under *Methods of Memorizing* and *Methods of Forming Habits*. Both of these have several factors in common which will be mentioned.

The *first* thing necessary is to have a strong motive. Much is dependent upon the earnestness that is put into the work from the start. In the case of habit, the "initiative" must be strong.

The strength of the motive is determined in large part by the affection of pupils for high standards. If the pupil is toned up to high speed and to accurate and efficient work, he will feel their absence more keenly. The methods of getting this were stated above.

The *second* thing necessary is to have the pupils clearly understand what is to be drilled. If neatness is to be drilled he should know definitely what he must do to be neat. If a poem is to be memorized he should understand the poem and much time should be spent in correcting his errors before the learning has gone too far. If he has to learn to handle a pen he should be shown with the most minute pains, concretely, by the teacher, just how it is to be held. Often a teacher will say to the class, "Now, let us see if we cannot read this better." But they can do nothing intelligently because they do not know what "better" reading means. If they are to cultivate a habit of good reading, they must understand what the elements of good reading are.

The *third* factor is repetition with attention. Mere repetition is not sufficient. Strayer[1] says: "A child learns to spell a word not simply because he repeats the letters or writes them in the correct order a hundred times. We all have knowledge of cases in which this sort of repetition has seemingly resulted in no advancement. The most economical method of learning to spell requires that the maximum of attention be given while the letters are repeated. The story of the boy who, after he had written after school the phrase 'I have gone' a hundred times, wrote at the bottom of his paper for the information of the teacher, who had left the room, 'I have went home,' is a case in point. The

[1] *A Brief Course in the Teaching Process,* p. 44.

trouble with this boy was not that he had not repeated the correct form often enough, but that he had not attended to it. He had failed to realize the significance of what he was doing. Doubtless his attention, instead of being fixed on the work in hand, was more largely given to the game of baseball his companions were playing, or to the prospect of the delights of the swimming pool."

In order to get a maximum of attention the periods of study should not be too long. The probabilities are that children waste half their time in studying a lesson. For it has been demonstrated time and again that where primary pupils go to school for half a day classes are as far advanced at the end of the year as when they spend the whole day in school. And schools in which one-half the day is spent in manual training classes even with little correlation between that work and the book and recitation work, are found to produce as good results in the "regular" school work as those which spend the whole day on it.

Again, if pupils can be taught to give ten minutes for a special drill study three times in a day at different periods they will produce better work than if they spend thirty minutes at one time. Pupils will practice this if the teacher is earnest and patient and takes time to show them that what they should strive to do is to do the best work in the least time.

Physical conditions assist in maintaining attention. Pure cold air is a great stimulant. Generally speaking, the position of attention, erect body, tense muscles, etc., if not carried to the point of fatigue, assist in keeping attention. On the other hand, some boys study best when sprawled out with nine-tenths of the body below the desk top. Those positions or conditions which are most conducive to attention should be studied intelligently and adopted.

Working for speed (but not at the expense of accuracy) helps to hold the attention and may safely be adopted after the thing to be memorized or habituated has been clearly understood and made accurate a few times without any thought of speed. First be accurate and then as rapid as possible is a good motto with which to hold the attention.

In this repetition there comes a time when the pupils and the teacher recognize that certain parts give difficulty. Then it pays to spend time on these. A pupil in learning multiplication finds trouble in remembering whether 6 x 9 is 54 or 56. This should have additional repetition and attention. The pupil should work out some trick for remembering this before returning to the table as a whole. In memorizing a poem some line or lines seem to be particularly difficult to master. These again should be drilled upon by themselves, and when mastered the drill upon the whole may be resumed.

The *fourth* important point is to permit of no exceptions. In memorizing absolute accuracy each time must be insisted upon. In forming a habit it should not be allowed to lapse. If a pupil is to make a letter in a certain way he should always do it. If he is to be neat, he should always be neat.

In case the pupil forgets something he should try to recollect it at first by unaided recall instead of at once consulting the book or the teacher. In spelling a word with which he has temporary difficulty, he should spell it to himself, write it out rapidly, look at it carefully before consulting the dictionary; for this practice strengthens the memory.

If he is forming a habit, and lapses, the original considerations that made him begin the habit should be reviewed. If he can get back to his first ideas he will be likely to have as strong an incentive for continuing as he formerly had for starting. For instance, he certainly had certain strong reasons for deciding to be punctual. Later if, when he lapses, he can be made to think vividly of the original reasons he had for making his decision, he will begin to be punctual again.

References for Class Reading

Bagley, *Educative Process, pp.* 121-124.

De Garmo, *Principles of Secondary Education,* Vol. II, pp. 159-177.

Pyle, *Outlines of Educational Psychology,* pp. 146-158.

Rowe, *Habit Formation,* pp. 260-273.

Strayer, *Brief Course in the Teaching Process,* pp. 41-50.

Exercises

1. Give six cases that have come under your own observation where practice improved accuracy or speed.

2. Does your own experience bear out the statement that skill produces a high degree of pleasure? Under what conditions might it not? Why?

3. Collect samples of careful writing from the best five writers in each grade from the primary grade to the fourth year in the high school. What do you observe concerning improvement in standards? How do you account for this?

4. Does it always happen that the student with the highest skill in school who outstrips some other pupil who has not so much absolute skill but who tries harder, always gives a better account of himself in life after graduation than does the less skillful student? Why?

5. How does a coach raise standards of excellence? Work out his methods in detail. What use could be made of these in regular school work?

6. "Honesty is the best policy." Apply this to cases

found partly in books but chiefly in practical life: cases where this principle was shown to be correct. Give two cases where it did not seem to be.

7. "The subject agrees with the verb in number and person." Give five of the commonest grammatical errors that could be cured by an application of this principle.

8. Give a half dozen humorous cases in which a person who knew a principle was unable to apply it.

9. Give five cases in which a method of handling historical situations in the past might be applied to modern situations. Wherein might they fail to work?

10. What geographical facts will assist in understanding the plan of campaign in the Civil War?

11. Give ten cases from your own experience in which the necessity felt for applying some principle or fact led to a study of that fact. To what extent could such a principle be used in school? What would be the effect upon the course of study if it were used as the only method of introduction to the study of each unit of subject-matter?

12. From the point of view of variety of application and practical value of the problems, estimate and compare two text-books in arithmetic or in any other subject in which you are particularly interested. How, also, does the number of drill problems compare with the number of application problems? Would you change this proportion? Why?

13. Take such a principle as, The volume of a cylinder is the product of the height into the area of the base, and make up four problems of a practical sort but of different types that would serve as exercises of application. Make a good practical problem that would serve as an introduction to the principle.

14. What is wrong in writing out a table of sixes to write all the sixes in a column, then the times, then 1,

2, 3, etc.? Is it better or worse than writing it across? Why?

15. State devices you have used for keeping your attention from wandering. From contributions made by the class what devices can you add to those mentioned in this text and in the references?

16. Are there any subjects in which application will give enough drill without special drill exercises? Upon what data do you base your opinion?

17. Give six recent cases in which, because of poor results, you have felt the necessity for drill and review of work covered previously.

18. Is it better in memorizing to read a selection of say twenty lines over and over until it is all memorized, or to read it and memorize it line by line?

19. What are your personal habits for best concentration of attention? Note how your habits differ from those of other students and in what respect they are similar.

CHAPTER XXIV

THE ASSIGNMENT OF LESSONS

Nature of the Assignment.—The essential characteristics of the assignment can best be demonstrated by a comparison with the recitation. This latter deals with subject-matter, motives, problems, solutions, and application. The former deals with exactly the same elements as are found in the assignment. The pupil has certain problems to solve, subject-matter to handle, hypotheses to make, verifications to carry on and applications to discover. The difference between the two lies entirely in the fact that in the assignment the teacher gives less directive assistance and the pupil relies upon his ability and intelligence to a greater degree than in the recitation where the teacher is handily present to assist in surmounting obstacles.

Dangers of different types arise in each. In the recitation too much assistance of an unintelligent and thoughtless sort is likely to be given, while in the assignment there is likely to be too little assistance of an intelligent and thoughtful sort given. In the former too much is told and too little discovered by the pupil; in the latter too little explanation and assistance is given, and, again, too little discovered by the pupils. The most usual form of assignment is of this type: Take the next selection, or take to page so and so. And, of course, in such a case the pupil has to both find the problem and master the solution, often an insurmountable task because of difficulties of words and facts which have not yet been clear to him. An assignment studied without necessary assistance is exactly the same as self-education without the teacher, since the self-made man stumbles along without assistance. And the paramount virtue of the teacher is supposed to be that of rendering assistance where help will be economical of time and effort.

The purpose of the assignment is the same as that of all school processes—to give such directions as will help the pupil to use his time and effort spent in study with as much economy as possible. Only, in the assignment all this direction has to be given before the study begins, while in the recitation the assistance is given point by point while the work is being carried on, a much easier thing for the teacher.

The Hardest Assignment for the Pupils.—The most difficult assignment for pupils to work out is the one just mentioned. Take from page so and so to page so and so. It is hard because, as was seen in the chapter on Text-books, such a unit has some problem and a solution for it. Consequently, the pupil has to work it out for himself. It could be made much easier for him if the teacher would uncover the problems and still easier if a little assistance were given to assure effort along right lines.

This unassisted form of assignment is the ideal form toward which the teacher's effort should be directed. It can be used occasionally where the pupils have been well trained as to methods of study, and where the intrinsic difficulties of the form and thought of the subject are easily within their powers, but there never has been a class in the grades, high schools, colleges and post-graduate schools which could not sometimes be wisely assisted by intelligent aid when the assignment is made.

Motive.—The student needs to have a motive for the study of an assignment just as much as he does for a development lesson. As a general thing the motive is a generic one or a combination of several. In some cases, curiosity leads him to discover the content of the assigned lesson; in others, desire for grades, emulation, etc., operate to make him study. But, a specific motive, the consciousness of the worth of this lesson in helping him to solve vital problems, is necessary and should be found before the study occurs.

The teacher has, of course, a relatively shorter time for doing this. However, there is no scientific basis for the amount of work to be covered in a year. By common consent, but upon empirical observation, school administrators have agreed upon a certain amount to be covered. But this is based upon the old cut-and-dried method of teaching. There is, therefore, no reason in the wide world why a teacher who works more intelligently, since this takes time, should not cover one-half this amount and no more, if in so doing the pupils are working economically and intelligently. In all probability, within a generation the amount of work covered will be cut one-half, so far as topics are concerned, and will be doubled in efficiency and in the intensity of study put upon what is undertaken. But, even as arranged on the present basis, the work will progress as rapidly, more rapidly, if time is taken to make the assignment intelligently, because the pupils will then be able to take a longer study lesson.

If the subject-matter is of immediate interest, the mere statement of the problem is sufficient, of course, as has been already shown (Chapter II). But if it is not of immediate interest, the motive has to be raised by an introductory discussion.

Definite Statement of Problem.—Sometimes, the teacher may tell the pupils to read the text and find out what are the problems the author is handling. This should, of course, be done only when there is no doubt about their ability to do so.

Earhart says:[1] "Little children will learn how to study by being trained into right habits of studying by the teacher. In their early oral work in literature, reading, or nature study, the process of training may begin, and as the children gain in power and maturity, more and more may be expected of them. To decide upon the name of a story they have heard requires reflection upon the story as a whole, and judgment as to the most striking characteristics. To find a better title to the reading lesson than the author has given, to find a more interesting title, or at least to find a different one that is suitable, will require similar effort, and makes a good beginning in mastering thought.

In addition to finding the subject of a lesson and its large divisions, young children can be trained to see what question or questions the author has answered in a paragraph or section. Teacher and pupils may work together at this until the latter get the idea, and then a lesson may be assigned to give practice in their new way of working. Children naturally ask questions calling for more information, more facts, or more reasons, and need guidance in making choice of such questions for class use. Questions related to the lesson but not answered in the book, or questions growing out of the thought given in the text, should be encouraged, and pupils should be trained to discriminate between those which are valuable and those which are not. They also need to learn how to express the questions well. A seventh grade which had less than a month of this work grew quite discriminating as to the nature and form of questions suggested by the members of the class. These

[1] *Teaching Children to Study*, pp. 145-147.

pupils objected to questions as being too long, as lacking clearness, as telling the answer, as being too simple, as being clumsy or poorly worded, and so on. They were giving themselves some excellent training in the art of questioning, and were mastering their texts, since they had to judge of the correctness of the answers given to the questions which they asked. Pupils in lower grades can do something in this direction."

But in general it is necessary to state the problems in the assignment until they are so trained. This statement should be definite. The questions should be as few in number as will bring out the gist of the assignment; because, on the one hand, a few comprehensive problems will produce more thought, and, on the other, the labor of copying problems by the pupils for home study should be minimized. Such problems should also be dramatic, interesting, and couched in simple language. Seldom should questions be asked that can be answered by *yes* or *no*. They should be works of art in that they require a maximum of effort in answering and are couched in the fewest words consonant with clearness and definiteness.

Illustrations.—Take, for instance, the following geography lesson on Germany for the fifth grade (eleven-year-old children).

GERMAN EMPIRE

Form of Government.—Until the year 1871, the country marked *German Empire* on the map was divided among a large number of small independent governments. In that year they all united to form the German Empire. The government is a monarchy, the present ruler, called the Kaiser, being Emperor William II.

Why Agriculture Is Prominent Here.—Germany is a better agricultural country than the United Kingdom, for two reasons. In the first place, there is a much larger area of level land. The northern half of the country is a plain, and although the southern half is hilly, and in places mountainous, there is much good farming land there.

The second reason is the warmer summer climate in a part of Germany, for Germany lies farther from the sea than the British Isles, and a large portion of the Empire is south of the southern part of England, and no portion extends so far north as northern England.

Farm Products.—Among the chief farm products are rye, oats, barley, and wheat. Little corn is raised, but potatoes, which were introduced into Europe from America, are a very valuable crop.

The Germans have so improved the beet as to produce the new kind known as the *sugar beet,* from which sugar is made. Hops, used in the manufacture of beer, and grapes for use in making wine are grown in great quantities. There is also much grazing, especially on the poorer soils and uplands, and there are great numbers of cattle, sheep, hogs, and goats.

Lumbering and Fishing.—There is much more forest land in Germany than in Great Britain, about one-fourth of the Empire being wooded. The Germans take great care of their forests, and even plant trees on land that is not especially valuable for farming. When wood is needed, certain trees are selected for cutting, while the others are left to grow. Such care of the forests is called *forestry,* and the forest lands of Germany are as carefully attended to as are many farms. The Germans are the leading foresters of the world.

Along the sea-coast there is much fishing, but this is less important than the other industries.

Mining and Manufacturing.—As in Great Britain, minerals are among the leading resources of this country. Coal beds exist in several parts, and there are also valuable deposits of iron ore, gold, silver, copper, lead, zinc, salt, and other minerals.

With abundant coal and iron ore, Germany has become a great manufacturing country, making all kinds of iron and steel goods, as well as woolen, cotton and linen goods. There are many other kinds of manufacturing, such as the making of sugar from sugar beets, the brewing of beer, and the manufacture of wine from grapes. Germany ranks next to Great Britain among the manufacturing countries of Europe.

Commerce.—Germany exports a great amount of sugar, wine, beer, textile goods, and iron and steel goods. Like Great Britain, however, she must import all of her cotton, much of her wool, and much of her food. What countries that you have studied might send these products to Germany?

Like the United Kingdom, Germany has important colonies, although they are not nearly so extensive as the British colonies. Her trade with these colonies, which are mainly in Africa, is of considerable value; but commerce with other countries is far more important.

For transportation of goods from one part of the Empire to another, Germany is greatly favored by her rivers. From the map you will see that the principal ones flow northward. What rivers do you find? Trace their courses.

Navigation is possible upon all of these, but it is most extensive on the Rhine. Boats can ascend this stream all the way from the sea to the boundary of Switzerland. How far is that? You can see how very important this must be in carrying goods across the Empire.

Great Centers of Population.—The chief seaport of

Germany is Hamburg, on the Elbe River. Bremen, west of Hamburg, is another important port. Why are these cities more favorably situated than those farther east on the Baltic Sea? There is now a ship canal across the peninsula south of Denmark. How is that an advantage to Germany?

There are many other large cities in Germany. The greatest of all is Berlin, the capital and largest city of the Empire. Here are located the palaces of the Emperor and many government buildings. Berlin has also many museums, noted picture galleries, and a large university. In addition, it is a great manufacturing center.

Leipzig is well known for its trade in books, while Dresden and Munich, like Berlin, have wonderful collections of pictures. The schools, universities, and museums of Germany are among the best in the world, and many Americans go each year to study. Cologne has an old cathedral of note, and Frankfurt is an important center of commerce. Locate each of these cities on the map.

Summary.— In this lesson, certain *world contributions* of the Germans are stated—the sugar beet, forestry, manufacturing, and river navigation. She is noted for these, and these are the important facts to be remembered. An assignment should, therefore, be made to cover these, and let the rest of the facts be picked up incidentally, if at all, by the pupils (excepting some of the more important cities).

Assignment Questions

1. Which states in the United States have borrowed the sugar beet from Germany and raise it profitably?

2. What should your state do to make its forestry methods as wise as those of Germany?

3. Why is Germany a great manufacturing country?

4. From what countries which you have studied could Germany secure cotton and wool for manufacturing?

5. What would the United States have to do to use its rivers as wisely as Germany uses its for carrying commerce? Why does it not do so?

6. Study the map of Germany carefully and from memory draw it—

   a) showing and naming the rivers given in the map.
   b) locating and naming the towns mentioned in this lesson.

The second question makes a practical application, is vital and interesting, and at the same time requires a careful understanding of what the German forestry methods are. Question 5 is of the same sort. Question 6 is of use as summarizing the pupils' knowledge of the topographical features and requiring a reading of the names and of important facts about the cities.

This sort of assignment raises clearly the question of following the text. Is every fact in the foregoing lesson of value, each point to be learned by the pupils? Some will answer in the affirmative. But the weight of argument is against it. Very few books are worthy of such study, as any one who has written a book or studied one intelligently knows. Much material must be used to give a context for the rest. Then, again, every text-book writer has his limitations. He has a poor perspective of what the layman not versed in the subject needs. To him everything in the subject has value, while for the outsider, and particularly for children, who are not specialists, this is not true. So, in the foregoing lesson, in my opinion, the important points about Germany given in this lesson are the ones I have picked out. Another teacher may hold a different opinion. But, whatever the points picked out, the fact remains that these and no others should be included in the assignment. Another instance of a slightly different sort is of interest because it involves a study of several reference texts. The same principle is in evidence—only the pupils have to select from several sources their material for answering the questions.

Illustration.—*A Lesson on the Crimean War.* This is a lesson in English history and is primarily concerned, therefore, with its bearing upon England. A synopsis of the various references are given, followed by the questions for assignment, with careful designation of short references.

Main Problem.—Describe England's actions in relation to the Crimean war in 1854-6? References:

Wrong, 2½ pages, p. 531. After Napoleon fell, it was Russia and not France that became the chief rival of England. She occupied parts of the Baltic and Black Seas, and wished to reach the Mediterranean. She reached across Asia to the Pacific and threatened India. In 1853 the Czar made a proposition to the English Minister at St. Petersburg to divide Turkey and allow England to have Crete and Egypt, while she (Russia) was to control Turkey. England refused this proposal. The trouble started in regard to the control of the Latin and Greek churches in Palestine. England had had peace so long that her army was very much disorganized. Russia had fortified Sebastopol and had spoken in regard to the partition of the Sick Man, Turkey, and made an attack on Turkish territory. England joined the Turks. The chief battles were Alma, Balaklava, Inkerman, and Sebastopol. Russia was forced to withdraw. *Terms of the Treaty of Paris:* Russia was to place no warships on the Black Sea and not fortify Sebastopol. This treaty was broken in 1870.

Gardner, p. 943, 4½ *pages.* The Eastern question had been one in which Russia had been interested for a number of years. It was concerning the partition or the dividing up of the Sick Man, Turkey. A dispute arose as to who should control certain holy places in Palestine. No compromise could be effected, so Russia negotiated with Sir Hamilton Seymour, England's representative, and presented the proposition, offering Crete and Egypt to England, while the Czar himself was to take Turkey. Russia sympathized with the Turks because they belonged to the orthodox church. The Czar also had ambitions to extend his dominions southward. England objected to this proposition. Then Russia demanded the protection of the Christian subjects. The four strong powers at that time were Austria, France, Great Britain, and Russia. These powers gave, in the Vienna Note, a proposal as follows:

Turkey to allow Russia to extend power to the Turks, but Canning, the British Ambassador at Constantinople, would not accept this proposition. Hence, war was declared by Russia. Two courses there were now for the allies. First, join and substitute European protection for the Christians for merely Russian protection, or, second, to destroy the Russian fleet on the Black Sea. England respected the Sultan's powers and said she could hold her own if existing charges were removed. So she joined Turkey and transported her armies to the Crimean territory. Then the battles of Alma, Balaklava, Inkerman, and Sebastopol took place. In regard to Balaklava, by mistaken order, the Light Brigade, of which the famous poem, *Charge of the Light Brigade,* was written, was annihilated. The winter in Crimea was severe. It was here that Florence Nightingale with her volunteer nurses did such efficient work. The terms of peace were the same as above.

Oman, p. 682, 7 pages. Russia had had her eye on

Turkey, the Sick Man, for some time. The Czar knew that England, France, and Austria would resent his invasion of Turkey, but he thought that he could satisfy them by dividing with them the spoils. Yet his proposition, as before mentioned, was rejected. The war was brought about by a quarrel in regard to the ruling of the Greek and Latin churches in Palestine. The key of the Holy Sepulchre, and the star that hung over the altar of Jerusalem, were the real causes of the trouble. England was not interested in the Key and Star, but she was interested in Constantinople. Canning, the English Ambassador, was given control of the East. He was an enemy of Russia, and he drew England into war. England and France joined the Turks. There was great lack of military preparation in England. Sebastopol, Alma, Balaklava, and Inkerman were battles that took place. The suffering of the English troops was horrible. By the treaty of Paris, the Czar was to cede Turkey a small strip of territory along the Danube. Sebastopol was not to be fortified. The Sultan was to give new rights and liberties to his subjects. This was not carried out. England and other nations agreed that privateering was to be discontinued.

Ransome, p. 440, I *page*. The origin of the war was the Czar's demand that the Sultan acknowledge his right to protect Christian subjects in Turkey. Lord Aberdeen's ministers failed to make Russia understand. England and France were for the Turks. Russia began the war by an attack on the Danubian provinces. The battles as before mentioned followed. The results were that the Russians were defeated and no fortifications were to be made by her on the Black Sea.

Terry, p. 1022, 3½ *pages*. The Czar wished the key to the Russian House. Lord Aberdeen was his friend. The

Czar spoke of the Sick Man, Turkey. Holy places in Palestine became the objects of dispute. The Ministry of England was divided in regard to what England should do concerning the war. Russia took advantage of this division and took possession of the Turkish side on the Danube. Russia misunderstood the fear that other nations had of her. Aberdeen's Minister was forced to resign and Palmerston came in. This seemed to give new courage to England. The battles above mentioned took place. Sardinia joined the allies. The conflict ended in the treaty of Paris.

1st, Sebastopol was restored, but not to be fortified.

2nd, The Danube was declared free.

3rd, The Christian subjects were to enjoy the privileges of other Christian subjects.

4th, Privateering was abandoned.

Russia broke this treaty in 1870.

Guiding Questions

(1) What was the Eastern Question? (See Gardner, p. 943; Wrong, p. 531; Oman, p. 682; Terry, p. 1022.)

(2) What did Russia want to do? Why? (Wrong, p. 531; Gardner, p. 943; Oman, p. 682; Ransome, p. 440; Terry, p. 1022.)

(3) Describe England's attitude and Russia's action in regard to Turkey. (See all of the above references.)

(4) Connect *Charge of the Light Brigade,* Florence Nightingale, suffering of the troops, etc., with this lesson. (See Gardner, p. 943; Oman, p. 682; Wrong, p. 531.)

(5) Give the results of the trouble. (See all of the above assignments. Terry and Oman are the best.)

Assistance in Solutions.—Frequently, it is necessary to assist the pupils still further, since there may be difficulties in the solution that will give unnecessary trouble.

In original solutions, such as in writing a theme, it may be necessary to help the pupils to collect data or to suggest sources from which it can be drawn. As an example of this, the foregoing lesson on the Crimean War is a case in point. In such a lesson as this: Describe the occasion on which you were most frightened. No assistance is necessary. But in a composition on The Trials of Early Settlers in Columbia, the teacher may have to designate whom to interview, what books and old newspapers to look up, etc.

Frequently in text-book work help has to be given. Difficulty may arise because of new words, which may need to be explained by the teacher. Some expressions obscure to the pupils may need to be elucidated.

Sometimes, and too frequently for the reputation of text-book writers, the subject-matter is poorly organized. This is lamentably frequent. It is often impossible for children or adults to find any unit in paragraphs, and this is frequently worse in the fourth grade than in eighth grade or high school texts. By a wise selection of the points of difficulty, and an explanation with the help of the class, much time can be saved and more intelligent effort can be put into the work by the pupils when they study. This is very well brought out by Bagley.[1] "In another fourth grade spelling lesson the following words were assigned for spelling: *close, clothes, brought, thought, carpenter, advantage, devour, pieces, comfortable.* The teacher's general method of assignment was to have each word carefully focalized, syllabicated, pronounced, and spelled, first silently and then aloud. In discriminating between homophones, the pupils were required to use the words correctly in sentences. In focalizing the word *clothes,* the teacher pointed to the *e* and said, "I want you always to remember to put this letter

[1] *Classroom Management,* p. 196.

in." When *brought* and *thought* were under discussion, the teacher asked if the words were alike in any respect. A pupil suggested that they ended in the same way. "Yes," said the teacher; "if we cover up the first two letters of each, they are alike. Then let us remember what these two letters are for each word." Mnemonic devices were used in focalizing *devour* and *pieces*. In the former case, the *our* was arbitrarily associated with *devour;* in the latter case, *pie* was associated with *pieces*. The pupils were familiar with the spelling of both *our* and *pie*. Just how far such mnemonic devices should be employed is an open question, but the results in these instances seemed to justify the practice. In order to test the efficiency of this assignment, the same words were given to the class five days afterward. Eighty per cent of the pupils spelled all of the words correctly; twenty per cent failed on one of the nine words. The same lesson was given to another class of the same age and grade, without assignment or study. One pupil spelled eight words correctly; another spelled only one correctly; the average standing of the class in the test was 47 per cent.

In the following problems in arithmetic for seventh grade pupils assistance needs to be given:

1. In using 1 oz. of formalin to 3 gals. of water as a steep for oat seed to prevent smut, what per cent of formalin is used? (1 gal. of water weighs $8\frac{1}{3}$ lbs.)

2. Formalin being 40 per cent formaldehyde, what per cent of formaldehyde is there in a 1-oz.-to-3-gal. mixture?

Such terms as *a steep,* formaldehyde and its uses, and 1-oz.-to-3-gal. need careful explanation even to farmer boys.

In a poem such as the *Epilogue to Asolando* certain explanations are necessary to a high school class.

At the midnight in the silence of the sleep-time,
When you set your fancies free,
Will they pass to where—by death, fools think, imprisoned—
Low he lies who once so loved you, whom you loved so,
—Pity me?

Oh, to love so, be so loved, yet so mistaken!
What had I on earth to do
With the slothful, with the mawkish, the unmanly?
Like the aimless, helpless, hopeless, did I drivel
—Being—who?

One who never turned his back, but marched breast forward,
Never doubted clouds would break,
Never dreamed, though right were worsted, wrong would triumph,
Held we fall to rise, are baffled to fight better,
Sleep to wake.

No, at noon-day, in the bustle of man's work-time,
Greet the unseen with a cheer!
Bid him forward, breast and back as either should be,
"Strive and thrive!" cry, "Speed—fight on, fare ever
There as here."

An assignment on this lesson may take the following form: First, have a discussion of what life is like after death, taking various views, suggesting others. Work up by illustration to the fact that one's idea of heaven is doing the things one loved best to do on earth. Then set these questions on the *Epilogue:*

1. What sort of man is described here?
2. What is his idea of what he will do after death?

But the poem needs a good deal of annotation to make it intelligible. This may be done by having the pupils make the following annotations in the margin of the text:

At the midnight in the silence of the sleep-time,
When you set your fancies free,
Will they pass to where—by death, fools think, imprisoned—
Low he lies who once so loved you, whom you loved so,
And —Pity me?

Oh, to love so, be so loved, yet so mistaken!
For What had I on earth to do
With the slothful, with the mawkish, the unmanly?
Like the aimless, helpless, hopeless, did I drivel?
Since I was —Being—who?

One who never turned his back, but marched breast forward,
Never doubted clouds would break,
Never dreamed, though right were worsted, wrong would
triumph,
Held we fall to rise, are baffled to fight better,
Sleep to wake.

Instead of pitying me
No, at noon-day, in the bustle of man's work-time,
Greet the unseen with a cheer!
me Bid him forward, breast and back as either should be, verbs
"Strive and thrive!" cry, "Speed—fight on, fare ever
There as here."

With such annotations, which seek to make it readable, the pupils can with effort understand it and get at an answer to the questions.

Drill Lessons.—In assigning a drill lesson, the most important thing to bear in mind is to impress upon the pupils the methods of memorizing and drilling that need to be kept in mind, for only by constant repetition will pupils get the habit of memorizing economically by concentrating attention, working for speed with accuracy, breaking the periods of drill up into small units, and in general working for the highest efficiency. Tabulating the results of time-tests will help much in making drill assignments successful.

Reviews.—In reviewing a large unit covering a week or more, the important fact to bear in mind is that the questions of review should be such as require a memory of only the important points. If certain parts have been memorized, they are of sufficient importance to be required. If none has been, then only the outstanding facts need to be organized. In history, for instance, it is a crime to require detailed statements of all events. Sufficient has been done if topical questions are set which touch the main facts and their significance.

References for Class Reading

Bagley, *Classroom Management,* pp. 192-206.
Earhart, *Teaching Children to Study,* pp. 145-157.

Exercises

1. Select six units of subject-matter and show what assignment you would make for each, stating the previous knowledge of the class. Use assignments for lessons of varying difficulty.

2. What qualities should a good assignment have?

3. At what time in the recitation hour should the assignment ordinarily be made? Give an example of its being justifiably given at the beginning of the period—at the close.

4. How can assignments as well as recitations be made developmental?

5. What should be the relation between the interest of class work and of preparation work?

6. What is the value of the study recitation?

CHAPTER XXV

THE LESSON PLAN

Section 1. Form of Lesson Plan

After long experience with lesson plans and the writing of plans by students, the writer has come to the conclusion that the less formal they can be made, the better for all concerned. If there are formal steps in the plan, the student-teacher feels that he must make each lesson conform to the plan, when as a matter of fact few lessons are true to type.

The lesson plan is a guess at what the teacher will have to do in the recitation. But it is only a guess, for the lesson may not work out in the way the teacher planned it, unless the teacher holds the class to *his* plan and does not follow the *pupils'* leads. Hence, I have found the following to be a good method of attack in handling lesson plans.

The first problem in preparing a lesson is to determine the function and structure of the *subject-matter* after the manner described in the earlier part of the book, in the chapters on function and structure of subject-matter and the psychological and logical organization of subject-matter.

The other big problem is to determine how this will be taught. The first is the problem of subject-matter, the second of method.

When *method* is taken up there are several problems to be considered. The order of their consideration is immaterial. But each has to be thought of in connection with every lesson. These may be tabulated as follows:[1]

1. *Motive.*—What form will the motive probably take, and how shall I handle it?

Three cases arise. A problem may arise in lesson of preceding days. The problem may need merely to be stated in order to prove attractive. Or it may be necessary to create a need for the work at the beginning of the lesson.

In any case, a statement should be made of how the problem is expected to arrive in the consciousness of the pupils.

2. *Type of Development.*—In the solution, should induction, deduction, or the general type of problem and solution be used?

3. *Psychological Organization.*—How is the lesson to be developed step by step?

4. *Past Experience.*—What past experience will probably have to be reviewed with the pupils? At what points should this be brought in?

It is often best not to do all this reviewing at the beginning.

5. *Points of Difficulty.*—At what points will the pupils probably need assistance? How should these be handled, giving specific questions? This is the crucial point in teaching. If one can handle expertly the difficulties the pupils meet, he has mastered the problems of teaching, for expertness involves just enough assistance, and no more than is necessary to give the pupils their rights in the matters both of effort and assistance.

6. *Summaries.*—What summaries should be made? At

[1] The specific questions that will probably be asked should be stated so far as is convenient.

what points should they be made? What should be the content of the summaries?

7. *Concreteness.*—What materials and devices should be used in making this lesson concrete? How in detail should these be handled?

8. *Drill.*—What drill exercises should be given, if any, in class, in assignment?

9. *Application.*—What application problems in class, in assignment?

10. *Assignment.*—What should be the next lesson's assignment?

a) Is it an application of today's lesson?
b) If a new lesson, how may motive be handled?
c) What explanations should be made?

I find this scheme for preparing a lesson to be very flexible. It leaves the teacher free to vary the order of his lesson and to introduce his material wherever it seems wisest to him.

Summarized Form.—Summarized the plan will take on this form:

A. Subject-Matter.
   1) Function (specific, intrinsic).
   2) Structure.

B. Method.
   1) Motive.
   2) Type of development $\left\{\begin{array}{l}\text{induction}\\ \text{deduction}\\ \text{general}\end{array}\right.$
   3) Psychological organization $\left\{\begin{array}{l}\text{data}\\ \text{hypotheses}\\ \text{verification}\end{array}\right.$
   4) Review of past experience.
   5) Points of difficulty.

6) Summaries.
7) Concreteness and realness.
8) Drill.
9) Application.
10) Assignment.

These are not steps. The steps taken are taken in the recitation. They are merely points the teacher has to be prepared for beforehand, so that the recitation may proceed with ease and satisfaction.

As a matter of fact, one really needs to know what past experience he must review, and what illustrative material he will introduce, before he can decide upon his psychological organization. The teacher, in preparing the lesson, will, before writing it out in final shape, have to first have a psychological organization of his own plan. That is, he will have to think it over, first one part, then another, in whatever order occurs, and then when it is all completed he can summarize the plan he expects to use. There is a good deal of fun in planning a lesson and watching where the plan falls short of what actually occurs. The student-teacher will often think he is prepared for every emergency and will then find that he has missed the mark. Perhaps in the fifth item (Points of Difficulty) he thinks he is prepared on every possible difficulty, and finds that points which he supposed the pupils would handle present real difficulties, while some of those he prepared for caused no trouble. So, also, in the case of the fourth point (Review of Past Experience) similar conditions may arise.

It is a good plan for a teacher, after every lesson, to run over the work and ask himself, "Where did my plan fail?" It is not a crime to vary the actual lesson from the planned lesson. What is needed is, by careful thought, to cover all possible contingencies, and measure the failure of preparation by the number of situations which the teacher could not handle expertly.

Section 2. Examples of Written Form

Take the lesson on *Excelsior* as given in *The Method of the Recitation* (pp. 329-332), as follows:

Plan for Teaching Excelsior

Age of pupils, 12-13 years (6th year of school).

Teacher's Principal Aims—

a. Enjoyment of a well-known poem, hence increased love of literature.

b. Appreciation of a certain moral idea, i. e., a lofty aim, with unhesitating pursuit of same.

SUBJECT-MATTER

Simple narrative taken literally. Meaning of difficult words and phrases. Leading facts in literal story.

METHOD OF PRESENTATION

Pupils' Aim—

To learn what became of a young man who attempted to climb the Alps.

Describe a lofty mountain. What are some of the dangers one might expect to meet in climbing it? How do the monks come to the aid of mountain climbers?

Read the poem, stanza by stanza.

What is meant by device, falchion, clarion, spectral glacier, awful avalanche, startled air?

Read the poem through carefully a second time. Describe the region. Tell the story.

Was the young man joyous or sad? Read answer in words of author. (vv. 2, 3, 5.) Was he attractive or unattractive in appearance? (vv. 2, 5, 9.)

What things tempted him to abandon his journey? (vv. 3, 4, 5, 6.)

Did he stop? What became of him?

Do you see any good reason why he should not have stopped? Was he, then, a foolish fellow, or a rash adventurer?

INTERPRETATION

Longfellow calls the young man beautiful, and in last two lines suggests his ascent to heaven. Story figurative.

The mountain signifies a steep road, the route necessary for an unselfish life. The happy homes and the three persons signify types of temptation, or of overcautious advisers.

Striking qualities of the young man are unselfishness, courage, determination, energy.

What is Longfellow's opinion of him in the last verse? How explain such approval?

Since the story is not to be taken literally, let us see how it should be interpreted:

What does the mountain signify? The happy homes? The old man? The maiden? The peasant? Why is the device spoken of as strange? The tongue, as unknown? Meaning of excelsior.

What are the striking qualities of the young man? How shown? How was a motto of value to him? Reason for frequent repetition of Excelsior?

Describe in full the kind of person the author seems to admire.

	Have you ever known or heard of such persons: Washington, Lincoln? Other persons in history? in present time?
All efficient persons, with high ideals, must show these same qualities.	Do you think that it is necessary for every good person to exercise these same qualities? Proof?
	Does this poem encourage recklessness? Proof? At what times do we most need to recall it? What are the advantages of possessing a high ideal? How is it helpful to have a motto?
Style.	Find some happily chosen words.
Diction—beauty, force.	Which stanzas show the character of the youth most forcibly, in your opinion? Which seem to you most attractive.
Good oral reading.	What precautions, if any, would you suggest for the proper reading of the poem aloud? Read it aloud.

Criticism.—I have varied this as follows in actual operation in preparation for a class. (As a matter of fact, *Excelsior* should be studied in the high school rather than in the sixth grade.)

A. SUBJECT-MATTER.

1) Function. To illustrate how a man of genius may set aside all temptations in accomplishing his purpose.
2) Structure as stated in Chapter VI, above.

We find above in McMurry's outline a plan in which the subject-matter is placed on one side of the page and the method on the other. This plan is faulty because it inevitably causes the teacher to follow the logical organization of the subject-matter on the left-hand side, and this, as we have seen, again and again, is an organization to be followed only in the summary. It is much better to first write out the subject-matter and then write out the method *below*.

B. METHOD.

1) *Motive.*—Discuss the question as to whether it pays or not to give up all sorts of fun and pleasures just for the sake of doing what one wants to do. Take cases *pro and con* from the pupils' own experience. Shall have four spectacular cases of my own to fall back upon.

   State what the poet Longfellow has written on this subject in his poem called *Excelsior* which will give his opinion. Let pupils restate problem to be discussed. (This is pupils' aim. The teacher's aim need not be stated in every lesson, because it seldom varies in any one subject.)

2) *Type of Development.*—So far as the pupils are concerned, this is of the inductive type. They are in *Excelsior* gathering another case in addition to those already given in 1, above, so as to reach a true generalization.

3) *Psychological Organization.*

   (1) Read the poem stanza by stanza.

   (2) Ask the pupils if they see what the author thinks about the question.

(3) If they do not, proceed possibly in the following way, taking up the literal story.

(4) (a) What did the boy look like? Gather up the descriptive phrases and get meanings wherever difficulties occur. (Tabulate on blackboard.) Summarize.

(b) In what condition was he found at the last?

(c) What inducements did he have to remain in the valley? (Tabulate and get meanings.) Summarize.

(d) Why did he not accept the invitations?

(e) Do you see now which side the author favors in our discussion?

(f) If they do, will let them verify by giving detailed interpretation, stanza by stanza.

(5) If they do not, proceed to interpret somewhat as follows:

(a) What does this banner mean?

(b) What name do we give a person with all these (tabulated) qualities? (Shall develop word "genius.")

(c) What things in life would the following stand for?

homes; answer, domestic happiness.

old man; answer, cautiousness of age.

maiden; answer, love.

peasant; answer, actual dangers.

monks; answer, religious formalism (author's statement).

voice; answer, reward pronounced by angels.

(d) Summarize inducements and meaning of each.

(6) Do strong people ever make these sacrifices? Examples.

(7) Again, does Longfellow think it pays?

(8) Do you? Why?

(9) They may or may not agree with Longfellow. That does not matter. What they have is Longfellow's view, and I shall see that this view is made part of them so that it will influence their lives.

This will be done by reading it over and memorizing it.[1]

4) *Review of Past Experience.*—In addition to that already stated, would expect that the meanings of many words as they occur could be gained from memory. Would have pupils describe other instances of perils of mountain climbing, and would insert them after (4) (c) in the preceding Psychological Organization.

5) *Points of Difficulty.*—Meanings of the following

[1] *Remarks.* It will be noted that this development differs from McMurry's in the following ways. The preliminary review of past experience in his case and in this are different. We use this review to raise the problem. He uses it to clarify the development.

The pupil's aim as stated by McMurry is not the problem as stated here.

McMurry gives the literal story and then adds the interpretation. Here we start seeking for his interpreted meaning and take up the literal story when the attempt at interpretation fails. I am convinced that this will produce a higher grade of thinking and will shorten the time necessary to get hold of the poem.

words. (Depending upon class.) Interpretation: particularly monks. Would develop religion as follows: He was a good boy. Why was the monastery not the place for him to stop? (Because he would not be satisfied there.) Why? (Develop, perhaps tell, the idea that he would have to do same things day after day, but that he wanted to go on and on; so passed formal religion by.)

6) *Summaries.*—All I would make are indicated in 3), above.

7) *Concreteness.*—Making the problem of the poem real to the pupils before beginning its study. Pictures and stories of mountain climbing, dealing fortunately with the beauty of the valleys and the rigors of the mountain tops. Many illustrations from their own experience. Strong discussion all the way through.

8) *Drill.*—Have poem memorized.

9) *Application.*—Have pupils collect stories, poems, and events in history in which men either did or did not do as this youth did.

Collect instances from their own lives in which they did or did not do as the youth did.

10) *Assignment.*—Have poem read aloud by class. There will be no home assignments in this lesson (which may take two days) until the last day, when they will be required to memorize part of the poem and write a paper giving a detailed instance of each of the four following cases:

(1) An historical character of the type of the youth.

(2) An historical character not of his type.

(3) A case in which the writer displayed the qualities of the youth.

(4) A case in which he did not.

These instances to be followed by the candid opinion of the pupil upon the discussion.

Following this, the assignment on the third day may be to complete the memorization of the poem.

This is an assignment of application, and no further explanation will be necessary.

Remarks. In writing on these points I have tried to be as informal as possible and have followed no set plan.

If this were written by a student-teacher to be read by a critic teacher, the critic teacher would get a good idea of the proposed lessons by looking at A first and then under B at *Motive* and *Psychological organization.* These having been read carefully the other points would readily yield any supplementary information.

Arithmetic—Fifth Grade

Aim.

To teach division of decimals.

The following is assumed as class knowledge upon which the process should be based:

1. Ability to read and write decimals.
2. Vivid knowledge of the relations of one hundred to ten, ten to one unit, one unit to one tenth, one tenth to one hundredth, etc.
3. Knowledge of the process of division of whole numbers.
4. The principle: multiplying or dividing both dividend and divisor by the same number does not change the quotient.

Preparation.

1. Division by integer.

a. Find the value of 1 acre of land if 15 acres cost $77,115.

```
     $ 5141
   ________
15)$77115
    75
    --
     21
     15
     --
      61
      60
      --
       15
       15
```

b. Find the value of 1 acre of land if 15 acres cost $771.15.

```
     $ 51.41
   _________
15)$771.15
    75
    --
     21
     15
     --
      6.1
      6.0
      ---
       .15
       .15
```

Compare the steps in (b) with the corresponding steps in (a). The pupil will experience no difficulty in telling the unit that each quotient figure represents, for he knows that dividing any number into parts does not change its unit.

Presentation.

a. 12 is contained in 36 how many times?

```
12)36
   --
    3
```

b. Multiply both dividend and divisor in (a) by 2.
24 is contained in 72 how many times?

```
24)72
   --
    3
```

c. Multiply both dividend and divisor in (a) by 10.
120 is contained in 360 how many times?

$$\begin{array}{r} 120\overline{)360} \\ \hline 3 \end{array}$$

Compare the quotients. Recall the principle: Multiplying both dividend and divisor by the same number does not change the quotient.

d. .2 is contained in 2.4 how many times.
Multiplying both numbers by ten, to what is the divisor changed? To a whole number.
2 is contained in 24 how many times?

$$\begin{array}{r} 2\overline{)24} \\ \hline 12 \end{array}$$

e. .22 is contained in 2.42 how many times?
Change .22 to a whole number, by multiplying both the numbers by 100.
22 is contained in 242 how many times?

$$\begin{array}{r} 11 \\ 22\overline{)242} \\ 22 \\ \hline 22 \\ 22 \end{array}$$

f. .005 is contained in .125 how many times?
By what shall both numbers be multiplied so that .005 may become the whole number 5?
5 is contained in 125 how many times?

$$\begin{array}{r} 5\overline{)125} \\ \hline 25 \end{array}$$

g. 2.88 is contained in 3.456 how many times?
By what shall both numbers be multiplied so that 2.88 may become the whole number 288?
288 is contained in 345.6 how many times?

$$\begin{array}{r} 1.2 \\ 288\overline{)345.6} \\ \underline{288} \\ 57.6 \\ 57.6 \end{array}$$

Many such examples will enable the pupils to formulate the generalization: "To divide by a decimal, multiply the dividend and divisor by the power of ten that will change the divisor to an integer, then divide as in simple division."

Criticism.—It is better in this lesson after taking up preparation 1a and b, to give a problem like this: How many slices of ham .2 in. thick can be cut off a ham with 4.2 in. in the clear? and get a problem in this form, $.2\overline{)4.2}$. If they handle it, give them another, harder problem. If they do not, then there is much good in saying, "Let us find out how to handle division where there are decimals in the divisor." To let them see what they are after is better and will produce more thoughtful results than Presentation a, b, c, above, without such an introduction.

If they cannot handle $.2\overline{)4.2}$, then I would say, I will give you two or three problems as hints, and would then follow with Presentation a, b, c, above, and, as I give b and c, I would ask the children if they yet saw the trick. When enough had been taken to recall the principle as given below Presentation c, above, I should then ask them what to do with $.2\overline{)4.2}$ in order to get the answer "multiply each by 10," and then would expect Presentations e, f, g to follow as application problems.

Lesson on Lesson Plans

The following quotation of a lesson and criticism thereof sets the point of initial problem out clearly:

Pupil's Aim: Why do I need to make plans, and what are the elements of a good plan?

SUBJECT-MATTER	METHOD OF PROCEDURE
I. Necessity for planning. A. Lack of interest in old work.	Do you ever grow tired of teaching the same subject over and over again?
B. Subject-matter changes. a. Subjects grow.	Why does a sermon out of the "barrel" lack in interest or power to inspire?
b. The experiences of different groups of children vary.	Do you know a subject thoroughly to-day because you once studied it? Why do different groups of children respond differently to the same materials?
C. Not safe to depend upon the inspiration of the moment for— a. Good questions. b. Illustrations and illustrative material.	Formulate three good questions which you might use in teaching a lesson on the oak trees to second grade children.
c. References to books or magazines. d. Plans for constructive work and the like.	Do you think you might have asked better questions if you had had time to think them over? What picture or other illustrative material would you use in teaching this lesson?

Do you think the children would gain by drawing a picture of the oak near by?

When do you think you will have had enough experience in teaching to be able to get along without making plans?

Criticism.—*In* trying this on a class and abandoning any attempt to follow the left-hand outline at first, I asked my class, Why is lesson-planning necessary? And, without suggestive questions of any sort, I received the following answers, Without it wandering occurs, cannot get in all that one ought, organization poor, cannot arrange time for different parts, and cannot get proper questions.

It will be noticed that several of these replies fit into the left-hand scheme, but not in the order given. After this preliminary question, which cleared up a good many points in the logical arrangement of the subject-matter, questions such as those connected with B, and C, b and c, were used. The point at issue is whether the students should be allowed to go as far as they can without suggestive questions, or whether it should be presupposed that every point must be suggested and in their logical order. And there seems to be every reason for taking the first rather than the second position.

Section 3. The Writing of Lesson Plans

The most perplexing problem that confronts the inexperienced teacher in the preparation of lesson plans is that of placing in a written form the things he wants to do in teaching a lesson. It is one thing to have a lesson plan; it is quite another thing to write one.

Yet the difficulties are chiefly mechanical, and arise from the fact that each thing to be done has to be put *somewhere*. Students worry over whether a particular thing to be done should be classed under preparation or development, under development or application. For instance, should the review of past experience be put in the preparation or the development? Or should the reading of a literature lesson be placed under application or development?

As a matter of fact, it makes little difference what we *call* anything to be done, provided we do it at the right time. Hence, McMurry[1] is wise in presenting a lesson plan which does not have the different phases marked off by lines. And in the same spirit of not introducing too many technicalities, the critic teacher is wise in laying down few rules in regard to the written form. If the practice teacher shows that he has obeyed the *principles* of teaching in his lesson plan, he may be excused from slavish adherence to any set form.

Methods of Alleviating Drudgery.—The written lesson plan is the heaviest cross of practice teachers. This is due to the mechanical difficulties just mentioned, and to the drudgery of writing it out in legible form. The critic teacher views it with hardly less dread than the practice teacher, for it means laborious monotony day and night. On the other hand, it protects the pupils from glaring errors in subject-matter and method. Writing the plan out makes the student think it out more exactly, and, in some cases, where the student-teacher is inclined to slight his work, the written plan serves as a check against neglect.

How to alleviate this drudgery is an important question. The following plan is suggested: For purposes of explanation, let us group the practice teachers in three divisions,

[1] *The Method of the Recitation*, pp. 329-332.

strong, medium, and indifferent. For the indifferent students there is no recourse except the writing of daily lesson plans, full and complete, as a check upon their carelessness. For the others, let us suppose that they are to teach twelve weeks. Require full lesson plans from everybody for a week. For two weeks at critic meeting take up the question of subject-matter, and nothing else. Then have the student teachers hand in plans in which subject-matter is worked out carefully, and do not ask for a statement of method. Since we have already eliminated the indifferent, the critic teacher knows that even though the student does not *write* his method, he is *thinking* it out from day to day. As the weeks go on, require the students to hand in subject-matter plans until there is confidence that they can organize it satisfactorily, and then there is no reason why they should not be excused from handing this in, though of course they will still work it out carefully for themselves. The strong students can be excused by this arrangement.

After spending a couple of weeks on subject-matter in critic meetings, motive may be discussed at a meeting or two, and during that time the students should hand in plans particularly full on this phase. When the teacher is sure that they can apply the principles reasonably well, they may be excused from handing in the plans. Then proceed to the principles of realness, or psychological organization, or whatever else is needed, *one at a time,* and expect particular attention to be paid to each till fairly well mastered.

This plan lightens the work of the critic teacher in these respects. The strong practice teachers can be excused from writing full lesson plans, the medium teachers can be excused from those parts in which they are strong. And the fact that they will be excused from the written work as soon as the teacher has confidence in their ability to handle it will raise the tone of the preparation of the whole class, strong, medium, and negligent.

In so far as the practice teacher never grows strong enough to be trusted in any of the work, there seems to be no practical way to get rid of this drudgery.

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