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Educational Psychology

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FIRST EDITION

New York Toronto London
McGRAW-HILL BOOK COMPANY, INC.
1948

EDUCATIONAL PSYCHOLOGY

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Preface

This book is developed around two closely related topics: understanding the learner and directing the learning process. Part I provides an overview of various aspects of the learner's development, including his physical growth, scholastic ability, interests, attitudes, and his social and emotional maturity. The purpose is to provide facts and generalizations which will assist the teacher in gaining increased understanding of the learner during his elementary and secondary school years. It is not enough that we know boys and girls of a certain age or grade; we must know them as they develop from one stage of growth to another. We appropriately begin with problems of growth and development and seek increased understanding of the learner.

The purpose of Part II is to assist the teacher in gaining skill in directing the learning process. The teacher is assisted in planning learning materials, in formulating instructional objectives for his courses, and in devising, administering, and using tests for measuring progress. After the stage for learning has been set, the teacher is further aided by chapters which deal with various elements of the learning program in action. These include the gains of learning, permanence of learning, effective use of incentives, and establishment of favorable conditions for learning.

But here as in Part I we never lose sight of the learner. We are even more directly concerned with the learner in instructional situations—with his improvability in response to training and guidance. In learning situations the pupil is put to the crucial test. Differences between learners become pronounced. There

we see the learner as an individual striving to accomplish a task or as one who evades responsibility; an individual who responds favorably to competitive situations or one who withdraws under such stimulation; one who displays initiative or one who must be driven.

The purpose throughout the book is to deal with important problems of the classroom and the school, problems which teachers meet in their day to day work. The book is planned for prospective teachers who are usually enrolled in introductory educational psychology classes in colleges, universities, and teachers colleges. It is also hoped that experienced teachers will be stimulated to reexamine their practices in the light of the material presented.

Since the materials are based for the most part upon research or experience in classroom situations, there will be little difficulty in making applications to practical problems. Although the major emphasis is upon applications to children in school situations which the prospective teacher may make, there is no reason why he should not seek further applications in his personal life, particularly in the case of his educational problems. To the student who is already engaged in practice teaching or one who has had teaching experience, the applications will be evident. Questions at the ends of chapters are designed to stimulate further thinking about problems suggested but not fully developed in the text. The selected references that accompany each chapter may be used for analysis of research and writing as reported in original source materials.

The writer is indebted to a number of persons for their assistance. Hazel Taylor of the Northern State Teachers College (Idaho) rendered valuable service in surveying research trends on the various topics discussed. R. T. Purnell, while a member of the Bureau of Educational Research, cooperated with the writer in preparing for local use "Directing Learning by Teacher-made Tests" (Bureau of Publications, University of Colorado, 1939), a considerable part of which has been expanded and used

in Part II. The author is indebted to Mr. Purnell for assistance in planning and developing Part I as well as Part II. Sections of two papers by the writer, "Testing and the Course of Learning," and "Remembering and Forgetting Arithmetical Abilities," which were recently published in the *Journal of Educational Psychology,* have been used in Chapters VIII and X.

Willard M. Brown, graduate assistant at the University of Southern California, studied each chapter in detail and made numerous improvements in the typescript during the stages of writing. The author's wife, Maude Cochran Davis, gave unstintingly of her time in critically reading the final draft and in improving the style of presentation. The book was prepared for publication during a leave of absence made possible through the cooperation of the author's colleague, Dr. Harl Douglass, Director of the College of Education at the University of Colorado.

ROBERT A. DAVIS

BOULDER, COLO.
February, 1948

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Part I

Understanding the Learner

CHAPTER I

Physical Growth and Health

As the individual passes from one age level to another, various aspects of his personality change. These changes include physical characteristics, such as height and weight, and mental changes as shown by intelligence test scores. There are also emotional and social changes which, though not so readily observed, vary with the stage of growth and development reached. Growth should be thought of as a continuing state of change from birth throughout the life span. The summation of all these changes from birth throughout life is growth. To understand a change in any particular trait at any age level, that change should be observed in relationship to all the other aspects of the individual's personality that reveal the total growth picture. The present chapter deals with the main elements of that picture.

The progress of physical growth has definite effects on the development of the individual's personality. As new emotional and social behavior patterns emerge, they reveal the neurological modifications that accompany maturation. Normal physical development must be assured if the influence of the school is to be effective.

A study of physical growth is, for these reasons, especially significant. The teacher needs to know the rates at which chil-

dren grow, the limits of growth, and the extent to which certain types of growth are indicative of other phases. Knowledge of normal growth is essential in order to be able to detect physical abnormalities or impaired health. Physical growth should form the foundation for detailed study of child development.

How Growth Is Measured

Scientists have a single measure of distance the world over. They use the meter with its various subdivisions. Investigators dealing with physical growth have no such uniform measure of human development, but they have been trying to discover one for a long time. Their aim has been to establish norms that are valid for total growth, in order to provide a basis for establishing a "physical age" as well as a mental age. The measures investigated include head breadth and depth, sitting height, leg length, carpal ossification or wristbone development, chest depth, chest breadth, hipbone diameter, dentition, and shoulder width, in addition to standing height and weight.

One approach to a growth norm has led investigators to search for a dependable index of skeletal age in the increasing mineralization of the wristbones. This is measurement of skeletal ossification. Use of the X ray enables pictures to be made of wristbones during successive stages of development. Measurements are made of certain significant bones and areas in the wrist and the sums of the dimensions obtained are used as the "raw scores" of skeletal age at the time of photographic record. Large numbers of scores obtained at regular intervals for individuals of many ages make possible the establishment of norms. The carpal development of a given child may then be compared with that of a typical adult. The degree of adult status attained will serve to indicate the child's approximate skeletal age. Comparison of this index with the child's chronological age makes it possible to calculate a "growth quotient." Although carpal ossification is a valid index of physical growth, necessity for special skill and apparatus in taking measurements precludes its general use.

Although the most conveniently measured aspects of physical growth are standing height and weight, neither measure affords complete evidence as to the extent of general bodily growth. Standing height and weight are more susceptible to measurement than growth in other dimensions. Although development in each physical dimension follows its own distinctive pattern, standing height satisfactorily displays the growth characteristics of both sexes. Growth curves based upon measurement of many other physical dimensions reveal similar trends.

Most studies of growth are based upon data derived from measurement of individuals at different ages. In this type of inquiry, measurements of height are secured for large groups of children. Then the heights of all 6-year-olds, 7-year-olds, etc., are averaged separately, so that the resulting age-group averages may be used in revealing height increases from one age level to another. It is obvious that in such computation extreme cases resulting from early or late maturity tend to balance each other. Under such conditions the curves derived will reflect not the extent of variability at a given age but merely the central tendency for each group.

Such curves are, nevertheless, useful in presenting the total picture and in making general comparisons of growth in height and weight. When a particular child is compared with a group, it must be remembered that averages based upon different groups at different age levels are frequently misleading for purposes of diagnosis and prediction. Experienced examiners are no longer disturbed by discovery that a boy is 2 inches shorter or 8 pounds heavier than conventional standards would indicate. They take into account the wide range of differences by which a child may vary from such standards and still be a normal individual in his own unique process of development. It is obviously important to have an accurate growth history of each individual in order to make reliable comparisons and predictions.

Studies affording most convincing conclusions on growth prob-

lems are those which have consistently accumulated data on the same individuals during long periods of time. In cases in which individuals or groups have been subjected to study and measurement during the entire school period, valuable information has been derived on individual variation, rates of growth, and relationships with educational and mental development.[1] In contrast to the older cross-sectional method of group analysis, this method is known as the "longitudinal" approach.

The Harvard Growth Study has been a source of valuable information on growth observed in identical children during their complete period of school training from the first to the twelfth grade. The continuous nature of such data makes it possible to approach problems of growth from a different point of view, with the possibility of more accurate prediction. In this study a simple formula [2] (applicable from ages 14 to 18 years) was derived for predicting weight on the basis of standing height, chest depth, chest width, and iliac or hipbone width. For example, in dealing with an adolescent between the ages of 14 and 18, we may, by making four linear measurements, predict with greater accuracy than heretofore the weight that he should possess.

In spite of greater accuracy in handling the data, none of the measures investigated has proved satisfactory as a uniform measure for the prediction of an individual child's physical growth. A series of measurements of various physical characteristics, comprising a growth history during the child's successive school years, affords the greatest possibilities for prediction. If all measurements made over a period of time are arranged in the form of a pattern, it is easy to study trends of growth and estimate with a fair degree of accuracy when a child will grow most rapidly and what his approximate limits of growth will be.

[1] For a typical study of an individual, see H. E. Jones, *Development in Adolescence,* D. Appleton-Century Company, Inc., New York, 1943.

[2] Dearborn, W. F., and J. W. M. Rothney, *Predicting the Child's Development,* p. 303, Sci-Art Publishers, Cambridge, Mass., 1941.

Patterns of Structural Growth

Growth in all its manifestations emerges gradually, even though rates of growth in all characteristics vary from time to time. All aspects of growth follow different general patterns of change in rate. Growth does not occur in "leaps and bounds." Growth and development are essentially gradual, highly complex processes and follow involved structural and functional patterns.

In tracing types of growth it is difficult to display more than the various measurements expressed quantitatively. We may plot the course of growth in strength of grip, but the compositional development manifested in muscles and bones and the acquired functional coordinations essential to display of strength are not easily plotted.

The total array of isolated facts of physical growth presents at first a confused and somewhat formidable picture. Before attempting to formulate principles of fundamental unity in the course of physical growth, we must have some conception of the tremendous diversity of the physical events that occur during the first two decades of life.

Variability in ages at which various structures appear to mature is a confusing aspect of the total picture. Weight increases about twenty times between infancy and adulthood, with notable differences in rate of increase at various ages. Bones, muscles, and lungs follow almost the same proportion. The heart continues to grow until after the twentieth year, and the rate of heart beat is more rapid in youth than later as a result of its limited size and capacity. The basic metabolic rate, or that of chemical changes in living cells, is higher during this period of relatively rapid growth.

During the prenatal period, brain weight and eye development, however, have already reached a high state of maturation. At 5 years the eyeball is almost fully grown, and at 10 brain weight is almost equal to that of an adult. Visual acuity displays progressive improvement in the first decade of life, during which its

maximum is reached. The various muscles develop at different rates, although muscular strength does not increase rapidly until the middle teens. Shifting relationships in bone development and neuromuscular coordination account for much adolescent awkwardness. Adolescent acne (pimples) is attributed to glandular imbalance during the adjustment period.

The tendency of rates of types of growth to become increasingly variable during the first decade but to become progressively more consistent during the second is illustrated in the curves of Fig. 1.[3] One may think of the different structures and dimensions of the body as seeking different routes to ultimate maturity at the developmental level of early adulthood. The implication suggested by the curves of Fig. 1 that physical equilibrium is then fully attained during early adulthood is misleading.

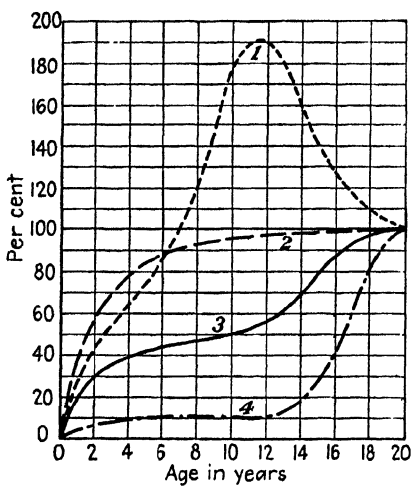


FIG. 1.—Types of postnatal growth.

Figure 1 shows rates of growth in four categories of physical traits, expressed in terms of percentages attained each year with an assumed maximum at the age of 20 years. We are interested primarily in types 2, 3, and 4, which include, respectively, *neural*, *general*, and *genital* development. The neural system as a whole develops much earlier than bodily structures or the sex organs, being 90 per cent mature at the age of 6 years, although mature functional coordination has not been achieved at this age. General bodily development follows a gradually decreasing rate during the first decade, but increases in rapidity during the first part of the second. The sex organs

[3] SCAMMON, R. E., "The Measurement of the Body in Childhood," *The Measurement of Man*, p. 193, University of Minnesota Press, 1930.

generally show relatively little structural development until the twelfth or thirteenth year, when their growth accelerates at a higher rate than that of general bodily development. Pubescence usually occurs considerably later with boys than with girls.

In spite of the apparent complexity and relative independence of the successive physical events during the growth period, there is a high degree of unity and orderly sequence. The most convincing evidence of unity, with respect to rate of physical growth, is in the occurrence of two well-defined cycles of development. The first cycle begins during the prenatal state and continues until approximately the close of the first decade. The second cycle includes the characteristic physical changes of adolescence. Each cycle is characterized by two phases of growth: one of acceleration and one of deceleration.

The accelerating phase of growth during the first cycle occurs during the prenatal period. Growth at the time of birth is still at a high rate but is within the decelerating phase of this cycle. It decreases rapidly during the first few years of childhood and continues to diminish slowly during the remainder of the first growth cycle.

During the first cycle, physical growth appears to be largely under the influence of hereditary factors. These factors are associated with each dimension and each organ in determining rate of growth and are suggestive of ultimate status. These original genetic factors are believed to have strong influence during the entire span of life.

Prediction [4] of adult stature may be made during the first cycle more reliably than during the second. The stature of girls between the ages 6 to 9 years shows correlation coefficients of +.73 to +.82 with stature at maturity, as compared with correlation coefficients of +.64 to +.71 obtained in the case of prediction made at the ages of 11 to 12 years. Stature of boys at 6 to 9 years

[4] SHUTTLEWORTH, F. K., The physical and mental growth of girls and boys age six to nineteen in relation to age at maximum growth, p. 61, Monographs, Society for Research in Child Development, Vol. IV, No. 3, 1939.

shows correlations of +.72 to +.80 with adult stature, but their stature at 13 to 14 is thus correlated by only +.56 to +.61. The more accurate prediction during the first cycle than during the second is attributable to absence of the variable and conflicting influences of adolescent determiners of growth rates.

Differential sex factors also operate during the first cycle. At birth a boy as a rule is taller and heavier than a girl. The same difference may usually be observed at full maturity. This lead in dimensional growth is maintained by boys, although girls usually complete the characteristic development of this cycle at an earlier age. In width of hips, girth of calf, and depth of subcutaneous tissue, girls take the lead at ages varying from 7 to 12 years. That girls are prepared for the physical changes of adolescence 2 to 3 years earlier than boys is a recognized sex difference. Occasionally individual differences exceed sex differences. This may be illustrated by the tendency of some girls 6 years of age to be slightly taller and heavier than other girls, even surpassing some boys of the same age.

The turning point between the first and second cycles is characterized by a brief period of minimum dimensional growth. This period of retarded growth is especially significant in the developmental history of the child. From this point, the age at which the child will attain the halfway mark between the accelerating and the decelerating phases of the adolescent cycle may be predicted with a high degree of certainty. If we know the age at which a child's increment of growth in height is *minimum,* we may predict that in approximately 2 years he will reach the point of *maximum* increment in height. This consistent relationship between age of least rapid growth and that of most rapid growth may be observed not only in children of either sex but also in those who mature early as well as late. Thus, continuous measurement of an individual's height is a valid means of determining the age at which adolescent changes occur most rapidly.

The physical changes of the adolescent cycle are of particular significance to the teacher, inasmuch as the individual emerges

from this period of life no longer a child, but an adult. The period is characterized by completion not only of sex differentiation but also of dimensional growth to approximately adult proportions. Disturbances in a child's physical development at this time are readily projected into his mental, emotional, and social life. Inability to develop in accordance with the characteristic adolescent pattern often results when the individual deviates markedly from the typical physical development of his age group.

The individual's growth during adolescence is believed to be peculiarly under the control of endocrine factors. It is believed that the accelerating phase of the adolescent cycle may be stimulated by a hormone secretion of the pituitary gland. During this phase the individual attains sexual maturity. It is believed that further growth is checked by the influence of sex hormones. Emergence of secondary sex characteristics may continue for some time after adult stature is attained. In other words, the endocrine factors that appear to accelerate growth may also create the forces that ultimately decelerate such growth. Extended growth beyond the adolescent spurt has been regarded as a result of genetic factors continuously operative from birth.

The time at which endocrine factors first seem to exert a marked effect on the rate of growth appears to be fixed by heredity. This belief finds support in the tendency of menarcheal ages to be coincidental in the case of identical twin sisters. We may look upon this spurt of intense growth to which the endocrine factors are believed to contribute during adolescence as a major deviation in a course of growth which might otherwise develop uniformly.

The earliest manifestation of adolescence is pubescence. In boys the age of pubescence ranges from 11 to 15 years, with the mean at about 13 years. It is extremely difficult to determine the age at which spermatogenesis first takes place. Girls are pubescent as a rule from 1 to 2 years earlier, with an average age at about 11 years. The age at first menstruation covers a wide

range of from 10 to 17 years, with the mean appearing between 12 and 13 years.

Variability in time of occurrence of various sex changes makes it desirable to determine in the typical pattern of adolescent growth a critical point that may be valid for all children. There are many advantages in selecting for this purpose the age during which an individual grows most rapidly in height. This point coincides with the peak of the adolescent growth curve. For convenience we shall identify this point as the *maximum-growth age,* or the MG-age. This point is closely related to the age of sexual maturity in both sexes. Correlation of +.75 has been found between the maximum growth age and the advent of the menarche.

Among other advantages of the maximum-growth age as a vantage point from which to observe adolescent change is the fact that it may be objectively determined, since height is a readily measurable aspect of growth. Its relationship to the age at which endocrine factors first appear to be operative in initiating adolescent changes is strikingly close. It also fixes a point in development whereby group growth patterns and sex patterns may be so compared that their consistent resemblance is demonstrated.

Figure 2 [5] shows a distribution of ages of children at their maximum growth in height. The figure is based upon measurements of 747 girls and 711 boys. The mean ages of girls is 12.56 years and that of boys 14.80, with a slightly greater variability in the case of boys. By subtracting 2 years from MG-ages, we may obtain the mean ages of minimum growth, 10.56 and 12.80, which have been found to be coincidental with the earliest adolescent change manifested in pubescence. These average ages correspond closely with the ages of 11 and 13 years, which have been determined from other studies of the onset of pubescence.

Figure 3 [6] presents generalized patterns of increments of growth

[5] SHUTTLEWORTH, *op. cit.*, p. 9.

[6] SHUTTLEWORTH, *op. cit.*, p. 29.

in standing height of selected groups of girls and boys. The broken lines show the curves of girls and the solid lines those of boys. Populations represented by the two curves having the highest peaks and designated as *X* (shaded letter) and *X* (ordinary letter) show, respectively, girls and boys who matured at

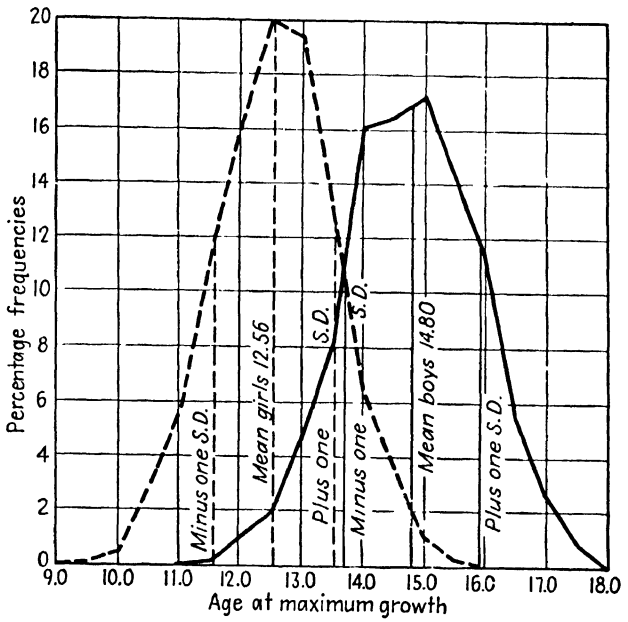


FIG. 2.—Distribution of ages at maximum growth in standing height by sex.

an early age. The two corresponding curves having the lowest peaks and designated as Z (shaded letter) and Z (ordinary letter) show, respectively, girls and boys who matured late. Of the girls, 156 are in the early maturing group and 177 in the late maturing group. Of the boys, 112 are in the early maturing group and 141 in the late. These groups were specially chosen to represent extremes in age at sexual maturity.

Figure 3 is so drawn that the curves of both groups of girls are superimposed with their peaks located on the same vertical line designated at the base of the figure as the mean MG-age of 12.56 years (for girls). Similarly, the two curves for boys are fixed with

their peaks on the mean MG-age line of 14.80 years (for boys). Thus, establishing the MG-ages at common points makes it possible to observe relative attainment both before and after the age of maximum growth.

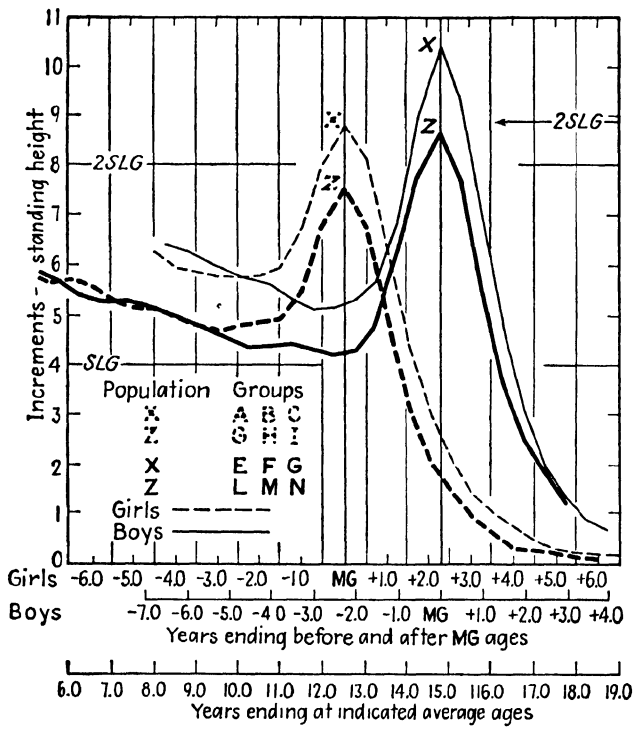


FIG. 3.—Generalized patterns of annual increments in standing height of groups of early- and late-maturing girls, arranged with maximum increments in the same vertical line at age 12.56 and comparable curves for boys with maximum increments aligned at age 14.80.

Figure 3 illustrates several significant facts concerning adolescent growth. First, for all groups of children the initial downward deflection or turning point in each curve occurs consistently 2 years (designated as −2.0) before each peak is reached. Thus, the figure graphically illustrates, between the points of *minimum* and *maximum* growth, the interval of 2 years which is fundamental in the prediction of age at sexual maturity when the age

of onset of adolescence is known. Second, the early maturing girls and boys manifest greater increments of growth in standing height at their MG-age than the later maturing girls and boys. Third, the four curves display a striking similarity in total form to such an extent as to suggest that the curve of a major portion of the adolescent cycle is typical of *all* children, regardless of sex or age at onset of adolescence. Obviously, rates of growth vary in different children. But after the cycle is initiated, they follow comparable trends.

Many points of resemblance to growth characteristics in other dimensions during adolescence might be shown. In general, all aspects of dimensional growth are highly synchronized. Much of the discussion with respect to standing height has closely related application to sitting height, leg length, hip diameter, chest breadth and depth, and body weight.

Figure 4 [7] presents curves for total growth based upon the standing height of groups of girls and boys. The curves are derived from repeated measurement of 25 early maturing girls, 149 average, and 33 late; and 21 early maturing boys, 117 average, and 23 late.

Attention is drawn to several significant facts that are revealed by the curves. First, some girls maintain superiority in height over some boys during a major portion of the growth period and are not surpassed until the age of 16 years. Second, the earliest deflection of the upward trend of each curve occurs uniformly 2 years before the MG-age of each group, thus marking the beginning of the accelerating phase of adolescent growth. The reverse deflection in each curve, where leveling off begins, marks the beginning of the decelerating phase. Third, growth continues with a high degree of intensity for boys beyond the comparable points at which it diminishes rapidly for girls. In other words, at the age of sexual maturity girls are closer to the attainment of adult status with respect to height than boys. Fourth, during the

[7] SHUTTLEWORTH, *op. cit.*, p. 16.

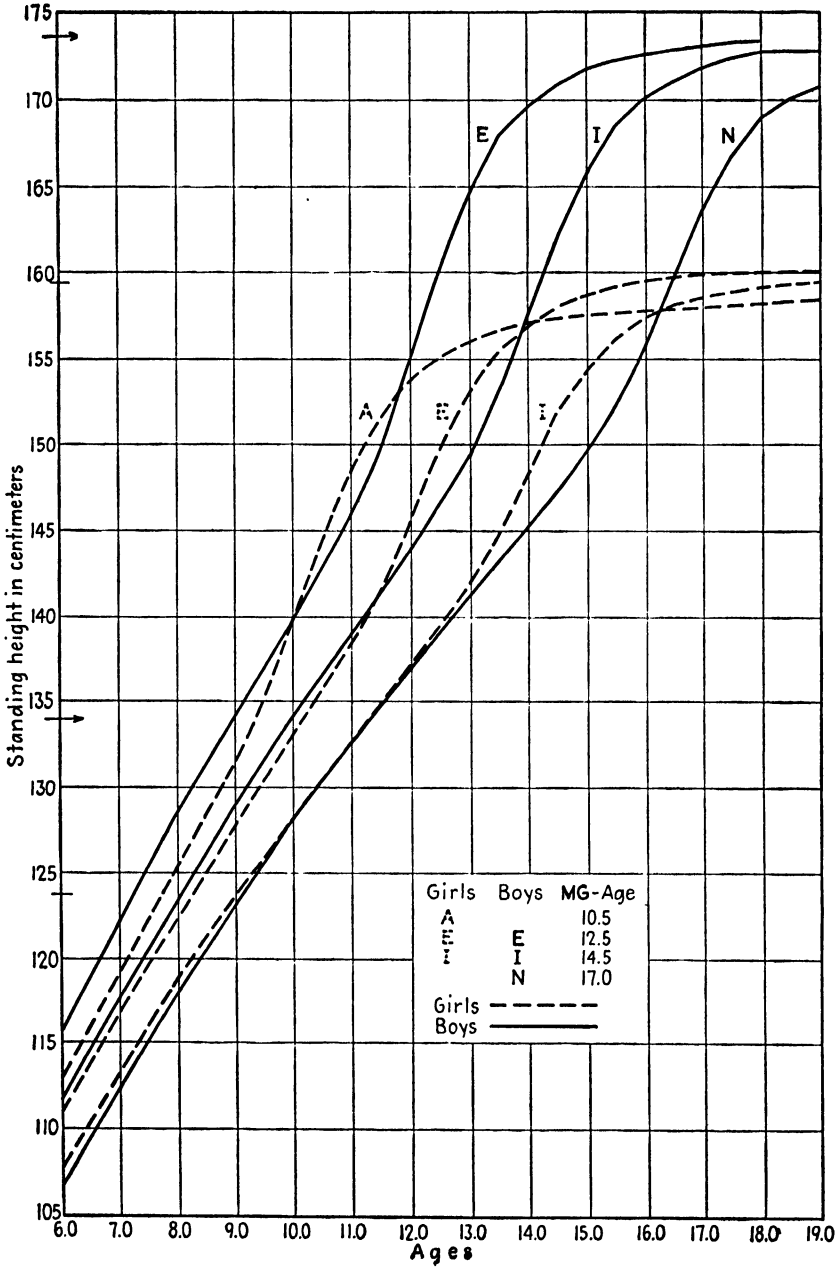


FIG. 4.—Growth trends in average standing height of selected groups of girls and boys having different ages at maximum growth.

accelerating phase of adolescence, which girls enter at an earlier age than boys, girls achieve superiority in height for 1 or 2 years before being overtaken by boys. Finally, boys tend to retain their initial relative positions with respect to height, whereas the *early* maturing girls appear to be slightly surpassed [8] in height by the *late* maturing group. The growth of boys slackens less abruptly following sexual maturity than that of girls.

Differences in Rate of Growth

Individual variation with respect to physical dimensions is an inevitable result of the complex interaction of variable forces within an individual. Generalizations which may be valid for the total picture will often seem less valid when individual patterns are considered.

Figures 5 and 6 illustrate variation of individuals of different ages. Figure 5 [9] shows the spread of standing height in the case of 167 girls, who are classified into groups ranging in age between 7 and 17 years. Each of the 11 superimposed curves shows a distribution of the height measures of members of each of the 11 groups. Although there is much overlapping, the various groups tend to increase consistently in height from the ages of 7 to 17 years. It will be noted that the curves indicating distribution of height among the 7-year-old group overlap those for the 5 years following. The curve for age 12 overlaps those for ages 7 to 16, and that for age 17 overlaps all but ages 7 and 8. Thus some 7-year-old girls are as tall as some 8-, 9-, 10-, 11-, and 12-year-old girls. Some 12-year-old girls are as short as some 7-year-olds, and some are as tall as others at age 17. It will be noted that the distributions at the ages of 14 to 17 show a much wider spread than those of earlier ages. Girls within these ages

[8] This trend is consistent with observations made from data of the Adolescent Growth Study, University of California, by N. Bayley and R. D. Tuddingham ("Adolescent Changes in Body Build," Chap. III, pp. 49-50, *N.S.S.E. 43d Yearbook*, Part I, *Adolescence*).

[9] Dearborn and Rothney, *op. cit.*, p. 324.

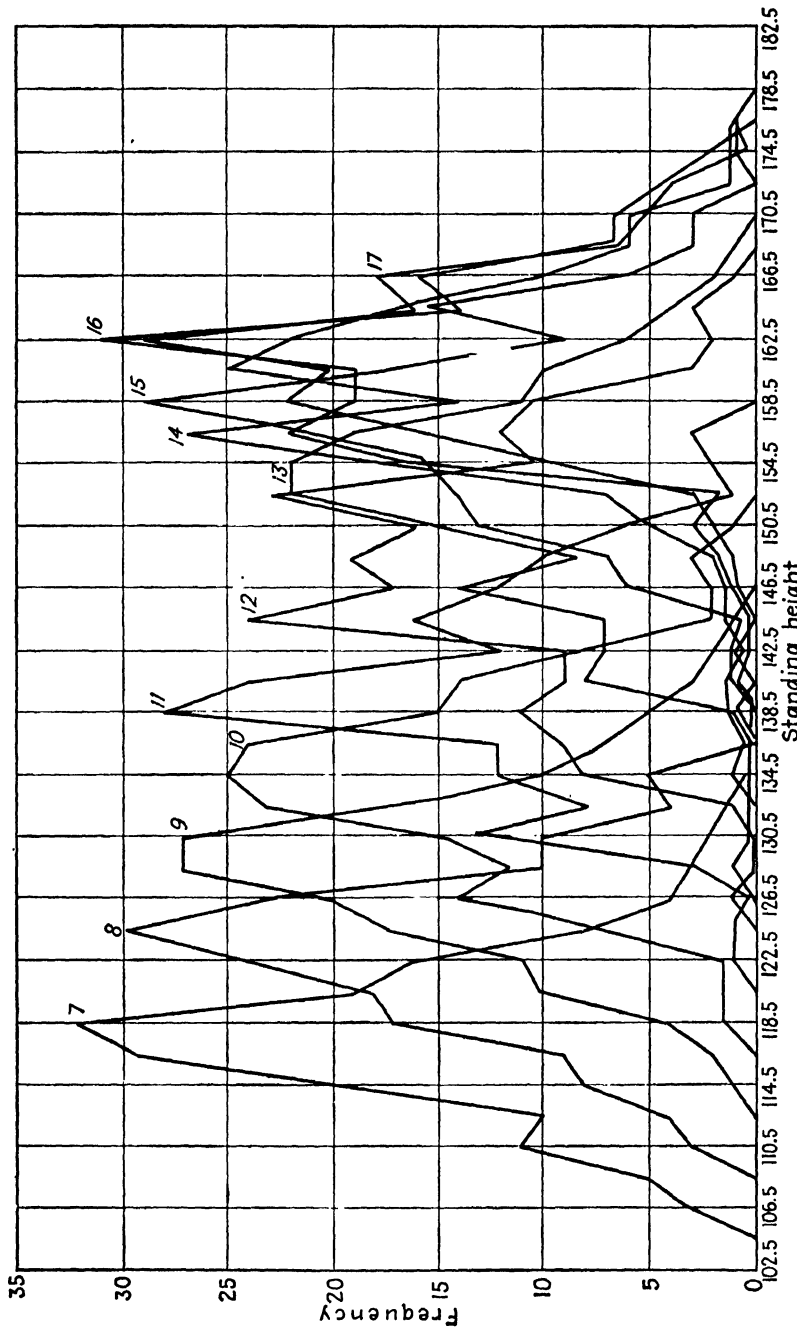


FIG. 5.—Distribution of standing heights of 167 girls at ages 7 to 17.

are well within the period of the adolescent spurt, when variability in age at the first menarche is reflected in variability in physical growth.

Figure 6 [10] reveals a similar overlapping in weight in the case of 167 girls. As in Fig. 5, certain examples of overlapping are striking. Some of the 7-year-old girls weigh as much as some of the 14-year-olds, and one could say that the 17-year-olds might have almost any weight. Weight has less connection with age than standing height.

Changes in Functional Growth

In observing physical growth, it is important to study one of its principal functional characteristics, bodily strength, because of its part in motor performance. We must not confuse strength with muscular development. In fact, the muscles of an adolescent, as determined by measurement of actual size, develop more rapidly than his strength. In saying that the hand has strength, we mean not only that the necessary muscles and bones have developed sufficiently to function in movement but also that nervous control has developed.

Coordination of muscular action is involved in most acts requiring physical strength, and certain aspects of the acquisition of strength contribute to the formation of behavior patterns. We may measure the strength of a single muscle, but its control involves a complex neural pattern. Skeletal growth implies many changes in the economy of applying physical strength, the advantage of superior leverage being significant. The adequacy of nutrition is unquestionably an important factor in determining the amount of force that an individual can exert at a given motor task or the endurance that he can display. Speed and accuracy imply a high degree of motor learning.

Deficiency in strength may mean incomplete coordination or lack of necessary muscle or bone growth. Such physiological

[10] Dearborn and Rothney, *op. cit.*, p. 234.

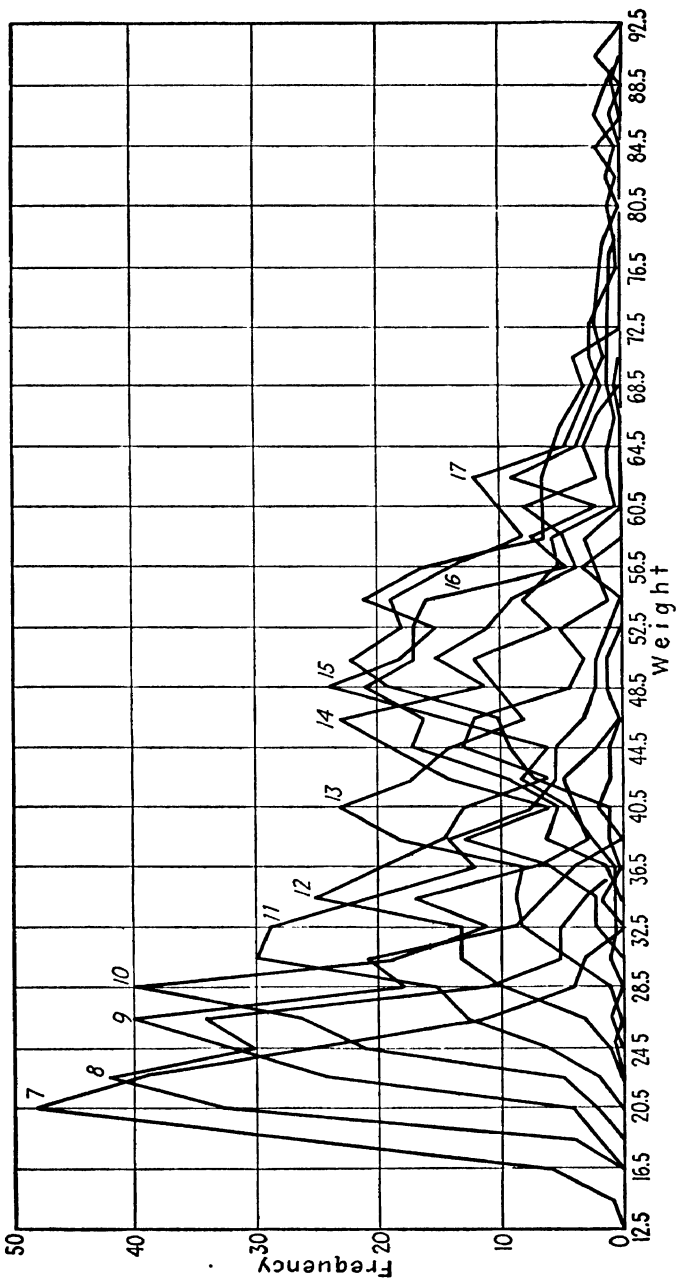


FIG. 6.—Distribution of weight for 167 girls at ages 7 to 17.

inadequacies may be caused by malnutrition of the tissues involved or excess of fatigue products. The reasons that some individuals have more strength than others are to be found among the various factors that comprise strength. We may only partly solve the problem of a boy who has meager strength in his arms by advising him to take exercise. It is necessary to consider deficiencies in bone size, muscular size, nervous control, and nutrition. Except for accidents, it is evident that bones, muscles, and the nervous system do not change much from day to day. To account for fluctuations of strength we must look for a solution among physiological causes. The boy may be hungry, tired, sleepy, or ill.

In studying growth of strength, we must be guided by behavior in gross motor performance, since it is there that general bodily movements involving strength manifest themselves with relative independence. Strength does not develop at a uniform rate in different parts of the body. In boys, for example, the adolescent rate in shoulder strength, both in pulling and pushing, is slightly higher than that in strength of grip.

Strength of grip has been studied most commonly as an index of attainment in physical strength, since it is easy to measure and record. Measurements of strength of grip show wide individual differences. Its relationship to other motor functions is definite. Coefficients of correlation ranging from +.50 to +.82 have been reported between right grip and various measures of arm, leg, and back strength. Strength of grip is commonly measured by means of a hand dynamometer. Units of strength are recorded in terms of pounds or kilograms. Similar dynamometers are available for measuring arm pull, arm push, leg lift, back lift, and other movements.

Figure 7 [11] shows characteristic curves of growth in strength of grip for boys and girls between the ages of 6 and 18 years.

[11] JONES, H. E., The development of physical abilities, *N.S.S.E. 43d Yearbook*, Part I, *Adolescence*, p. 103. (Boys' data based on H. V. Meredith, The rhythm of physical growth, University of Iowa Studies in Child Wel-

Growth in strength increases slowly at a fairly uniform rate, with an *accelerated* rate for boys and a *decelerated* rate for girls occurring approximately at the ages of 13 to 14 years. A striking sex difference may be noted in the fact that boys experience an extended period of growth in strength, which girls do not. It is possible that environmental factors, continued use of the body

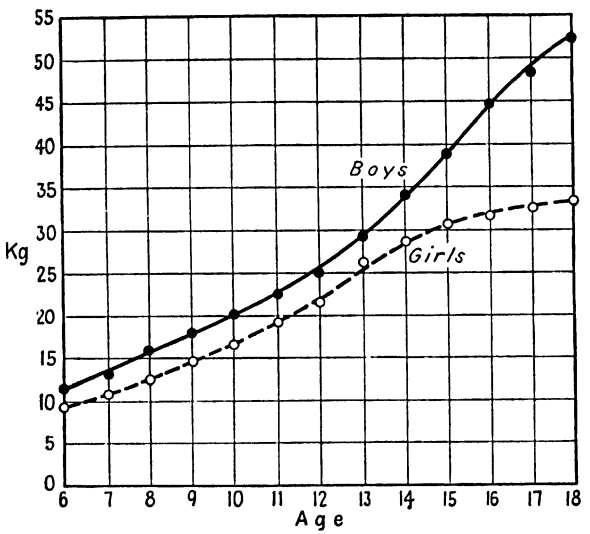


FIG. 7.—Growth curves in strength of grip.

during late adolescence in athletic activities and at relatively heavier work, have more to do with this difference than is the case in most physical growth. Maximum gains appear for boys at the age of 16 and for girls at the age of 13. Strength appears to lag about 3 years behind related growth in physical dimensions in both boys and girls. Likewise, growth in strength of grip continues for some time after that in many physical dimensions has greatly reduced.

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fare, Vol. 11, No. 3. Iowa City, State University of Iowa, 1935. Girls' data based on E. Metheny, The present status of strength testing for children of elementary school and pre-school age, *Res. Quart.*, 1941, 12: 115-130.)

Although measures of strength of grip reveal indices of static physical strength, there is considerable advantage in studying strength as dynamically exerted. Various indices of strength, based upon scores in activities such as the vertical jump, standing broad jump, distance throw, and the 50-yard dash, are used to determine growth in strength exhibited in performance in these types of activity. These activities are of limited value as meas-

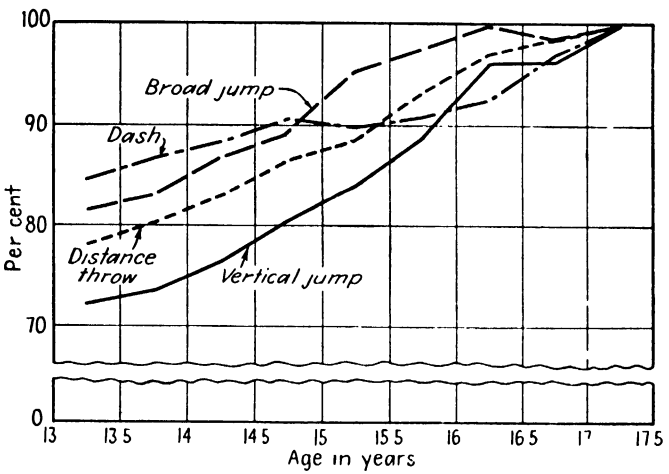


FIG. 8.—Growth curves of strength manifested in performance.

ures in the case of girls beyond the age of 13 years, since their performance shows little further improvement beyond this age. Ability in these types of performance often begins even to decrease in girls at this age.

Figure 8 [12] traces the course of growth for boys in four types of performance. The increase is somewhat gradual up to the age of 15 years, at which time an accelerated rate is evident in three of the activities. Since the curves are drawn on the basis of 100 per cent achievement at the age of about 17½ years, they do not reveal attainment beyond that age. From other evidence, however, we may expect further improvement during several years to come.

[12] JONES, *op. cit.*, p. 114.

Principles of Growth

Growth as Inner Change

As the individual advances from infancy to adulthood, the manner in which he grows is not one of simple change. The growth process is not simply one of accretion or quantitative increase, with each successive increment of growth superimposed upon those which have preceded. All types of growth involve inner change. Mature status in growth represents accumulation in amount and change in composition. There is progressive change in bone material. Mineralization increases with age. The adult is not just the child who has grown larger. Instead, he is the child who has changed qualitatively as well as quantitatively.

As pointed out earlier, the most readily measured initial growth occurs in height and weight. At the end of his first 4 months a baby's weight is generally double that of birth, and his length is about 40 per cent greater at the end of his first year. Less easily observable changes begin to take place in internal structure, such as the transformation of cartilaginous tissue into bone. There is a beginning of differentiation in function. Such differentiation accompanies the development of new interrelationships with related changes in concurrent dimensional growth. The child appears to use his entire body as he utters his first cries. His first oral expression is essentially a mass activity. Later, speech becomes localized, and independent control of organs essential to speech is acquired. His first acts of crawling and walking demonstrate a progressive coordination of structure and function.

Growth as Differentiation and Integration

With respect to structural and functional development, two concurrent processes known as "differentiation" and "integration" may be conceived. The first refers to progress from physical states typified by "mass activity" of original structure toward specialization or differentiation of structure and function. The process of integration is that of achieving "wholes" in the physical

equipment of the individual or in the activities which he attains ability in performing. The second process is not essentially opposed to differentiation; it simply moves with relative independence in a different direction. For the most part, differentiation and integration do not constitute experimentally demonstrable laws of growth; yet they are valuable concepts and aid our understanding.

Differentiation implies initial large patterns, from which specialized structural and functional units gradually emerge. During prenatal development, little adaptation is possible. The child at birth may be thought of as a temporary but essentially complete prototype. For example, a baby moves his entire body when seeking to obtain a given object and to extend both arms in its direction. He is also unable to judge distance and often attempts to touch distant objects or to express desire for them by reaching gestures. Later, he abandons leg and trunk movements and reaches with localized movement of one arm. For some time, however, he uses the whole hand to grasp objects until his fingers acquire manipulative skill. His early writing movements are guided by his arm and shoulder muscles instead of the fine muscles controlling wrist and fingers. Many other early activities of a child are of a random, diffused character and become localized only with maturity and practice.

In the process of integration, primary patterns and those which have been differentiated are combined and constantly reorganized into highly complex patterns. Physically, this concept applies most broadly to neuromuscular change, although it includes aspects of skeletal development such as the gradual change of certain cartilages into bone and the union of certain bony structures through fusion. A given movement, such as walking, requires not only the harmonious coordination of a large number of muscles but also the growth of bones that implement muscular action. Thus the undeveloped structure of the foot accounts for a child's early flat-footed walking and running.

Integration does not necessarily imply achievement of perfect

bodily unity and harmony. Except for certain minimum interdependencies, such as functions of various organs without whose performance other parts of the body could not live, there is abundant evidence that harmonious unity of the body is achieved slowly. For example, imbalance between growth of the heart and the arterial system at adolescence makes this period one in which permanent heart impairment may follow injudicious participation in school athletic programs. The heart is one of the last organs to attain full maturity.

The concepts of differentiation and integration apply to all aspects of behavior as well as to structural changes. Capacities for mental and motor activities emerge at various ages not only from progressive differentiation of gross patterns into specialized elements but from simultaneous recombinations and modifications. Learning to talk, for example, involves differentiation of a particular sound from many others that a child hears together with the formation of an association between word sound and meaning. The progressive nature of integration is well illustrated by the increasing complexity with which differentiated sounds are rearranged serially so as to convey meaning.

In general, growth involves continuous adjustment. Such adjustment is characterized by ever-changing inner relationships. These relationships develop through the synthesis and reconversion of inherited capacities as they are changed and modified to meet environmental needs.

Growth as Readiness

We commonly observe in children spontaneous emergence of ability to perform a given act, such as climbing stairs, in preparation for which they are not known to have received special opportunities for practice. For the performance of the act, minimum readiness has been demonstrated in every essential type of physical and neural growth. The situation itself apparently has provided the only known stimulation. Absence of training other than that which the child has received incidentally is the point

to be emphasized. The unobserved growth within the child leading to such behavior is referred to by such terms as "maturation," "readiness," and "inner growth."

States of readiness follow one another in a fairly definite sequence. A child crawls before he walks, uses oral language before he can read or write, and forms concepts of number before arithmetical operations become intelligible. Maturation levels presumably exist for all types of behavior, although we usually associate readiness with definite types of activity. Growth in readiness for various activities is essentially sequential growth toward the degree of complex organization or capacity required.

Especially significant is the fact that specific training prior to manifestation of ability to perform has little effect upon accelerating the emergence of a state of readiness. In fact, forcing a child into activity beyond the stage of readiness that he has attained may create distaste for the training, which later he would graciously accept. After the child possesses ability to perform a given act, training and practice may be effective in refining his behavior with respect to its speed and accuracy. For given types of performance, there may be still higher levels of maturation to be attained before increased speed and accuracy are possible. When a child is ready to learn, he will learn more willingly and efficiently than at any earlier time.

Obviously, such inner growth or maturation does not develop in an environmental vacuum or in a situation wholly barren of opportunity for learning. The child may be denied access to opportunities for practicing his entire action; but unless he is placed in a plaster cast, his environment will have permitted and suggested many isolated bodily movements and basic coordinations, in proportion as his physical and neuromotor development has made such activities possible. As a result, he may spontaneously acquire readiness for acts which he has not had opportunity to practice previously in their entirety.

Although maturation includes both structural and functional growth, certain behavior patterns are particularly related to ap-

propriate maturation of physical structure. States of readiness are essential in the various type of games and athletic activities of greatest interest to children. Ordinarily, children prefer activities in which they are physically fitted for success. Football and baseball, if attempted by younger children, are usually played with rules informally modified in order to make such games physically possible. Physical maturation is an important consideration in ability to learn to write. The handling of a pen is awkward until the hand is large enough and certain muscular coordination in finger movement is acquired. Up to a certain stage of readiness, a young child may be expected to do little more than crudely grasp and direct the movement of a coarse pencil or crayon.

Of educational importance is the fact that the child cannot satisfactorily perform motor or verbal operations until he has attained appropriate maturational levels. Attainment of such levels may be accelerated to some extent if the child's environment provides opportunity for practice in preparatory skills. A barren environment may result in retardation of maturation.

Readiness for undertaking educational experiences is dependent upon maturation. All children do not attain similar maturational levels at the same chronological ages. A child's readiness is the criterion for the type of experiences from which he may most benefit. Hence it is unwise when choosing experiences to include those which will necessitate the forcing of growth in slow-developing individuals. Likewise, it is uneconomical to penalize rapidly developing children by postponing experiences for which they have readiness.

What Physical Growth Means to the Individual

It must not be overlooked that during the entire span of growth the individual gradually includes more and more in his meaning when he says "I." The infant is scarcely aware of the fact that he is anybody. The adult often has a valuation of himself so high that an unpleasantly spoken word or phrase may constitute

an attack upon his dignity. One of the many factors in the development of a concept of self is the increasing awareness that one is identified with a physical body. It is with this body that appearance before the world is made. This body is constantly engaged in activity. Its changing size, form, and functions are vital elements in the evolving picture of self which the individual forms.

The infant soon becomes conscious of his body through exploration, and his early awareness is further stimulated by parental training. He is instructed by parents concerning certain bodily functions, observance of conventions of privacy and modesty, clothing and dressing. He is given increasing responsibility in caring for the body. When he makes contacts with other children, he perceives physical differences. His feeling of capability is increased as he discovers the fertility of his surroundings in satisfactions for bodily needs. The most significant concept which he forms is that of typical human beings. This concept is soon differentiated to an extent that he has definite notions of the general physical appearance of boys or girls of ages close to his own. As his associations and experiences are extended, he develops other differentiations in his concept of human beings into which he fits individuals of ages and circumstances different from his own.

Ability to understand individuals having similar physical characteristics is a possible explanation of the reluctance of a given age group of children to accept a physically atypical child. On the basis of such a standard of values, a child's evaluation of self tends to include comparison of his own physique with that of other children. If he is unusually fat, tall, or afflicted with a structural defect, his difference from other children is detected; and their ridicule may painfully accentuate to him his physical difference. A place among the members of his age group often transcends the importance that he attaches to relationships with older children and adults. Although other factors, such as possessions, responsibilities, and personality, influence the individ-

ual's valuation of self as he grows older, physical appearance and bodily development remain important criteria of acceptance or rejection by other children.

The extraordinary character of physical change that occurs in boys and girls at the time of adolescence gives rise to many complex problems of personal adjustment. The general aspect of this change is manifested in rapidly accelerated growth and in general bodily dimensions. This acceleration is most marked in bodily structures whose functions relate to sex. The maturation of the procreative function lends impetus to the formation of viewpoints toward the other sex which are expected to emerge as children are developed into men and women.

Two additional factors must be considered in dealing with the problems resulting from accelerated physical change. One is the absence of synchronized sequence in the different elements of change. Variation between leg length and trunk height occurs in many boys and girls for short periods, making them appear long-legged and short-waisted. Disproportion between width of hip and shoulder, and disparity between strength and muscular size, further illustrate irregular timing in development.

A second factor is wide variation in the age at which onset of adolescence is first evident, in the rate of change manifested by early and late maturing children, and also in the age at which sexual maturity is reached. Although girls characteristically approach sexual maturity at an earlier age than boys, variation among individuals of each sex is equally normal.

During adolescence, the individual acquires an increasing consciousness of self, begins to establish his own ideals, and makes attempts to harmonize with such ideals. The adult world assumes new meaning, and there is striving to prepare for its acceptance. Increasing awareness of the opposite sex impels the individual to seek social contacts that give assurance of sex appropriateness. Changing physical characteristics emphatically symbolize the expansion of self during this period as the individual begins to make comparisons with new and additional standards. He thinks not

only of members of his own age and sex group but also of members of the opposite sex and of adults. Out of these conflicting comparisons between self and others gradually emerge adult modes of behavior. Other factors, such as economic status, gradually supplant in importance physical characteristics which initially shaped the individual's notions of self.

Health

The picture of growth presented in the preceding sections suggests that development of the child occurs in accordance with fundamental principles of growth. For this to be true, normal conditions must exist. Development may be accelerated or retarded according to the extent to which a child's environmental factors have favored growth. Among the factors that favor growth are nutrition, security, exercise, sunshine, and rest. Factors that interfere with growth include disease, accidents, physical handicaps, malnutrition, and insecurity.

Although for purposes of discussion we deal separately with emotional, mental, and physical traits, it is apparent that biological inheritance and environmental factors are their common determiners. Since the basis of emotional, mental, and physical behavior resides in the relationship of structure and function, it follows that physical health is an important requisite for desirable mental and emotional behavior. Consequently, the teacher is concerned directly with the safeguarding of physical health.

Children cannot fully benefit from instruction if their physical condition is poor. Serious physical defects may impede progress of normal physical and mental development. Evidence that physical defects are interfering with normal growth is indicated when a child is listless, irritable, lacking in interest and enthusiasm, or unable to concentrate. He may be easily fatigued, readily discouraged, or inclined toward asocial behavior. He may be reluctant to participate in the activities of the class. In such cases, medical examination may reveal malnutrition, weakness of kidneys or heart, or some disease such as asthma, goiter, or

tuberculosis. Decayed teeth may be poisoning his system or interfering with digestion.

Many physical handicaps that interfere with normal growth are not obvious. Pupils are disposed to minimize the seriousness of a handicap or to conceal it from fear of its interpretation by classmates as weakness, when social prestige requires strength and vigor. Teachers must search for evidence of physical handicaps and communicate their suspicions of difficulty to school medical supervisors. Physical conditions that are not readily recognizable may affect pupil growth and efficiency more seriously than acute illness having more conspicuous symptoms such as flushed face, sore throat, running nose, rash, or fever, which immediately suggest need for treatment. Undesirable pupil behavior, if analyzed in terms of causes, may often be found to result from physical condition. Such behavior must be regarded as symptomatic and not synonymous with its cause.

TABLE I.—AVERAGE PERCENTAGE OF STUDENTS EXAMINED ON ADMISSION TO COLLEGE WHO WILL BE FOUND TO HAVE SIGNIFICANT PHYSICAL DEFECTS *

Nature of defect	Percentage
Nutritional:	
Underweight, 10 per cent or more	28.0
Overweight, 10 per cent or more	6.5
Uncorrected visual defects, 20/40 or more	11.0
Dental caries (examined by dentist)	70.0
Defects of nose and throat:	
Chronic nasal obstruction	20.0–30.0
Chronic tonsillitis	10.0–20.0
Defect in body mechanics:	
Spinal curvature	15.0–20.0
Flat feet (2d or 3d degree)	4.0
Valvular heart disease	0.6–2.0
High blood pressure (systolic pressure permanently over 150 mm.)	0.2–0.4
Evidence of tuberculosis (adult type)	0.4–0.8
Evidence of syphilis (by repeated positive Wassermann tests)	0.3–0.4

* DIEHL, H. S., and C. E. SHEPARD, *The Health of College Students*, p. 46, American Council on Education, Washington, D. C., 1939.

Medical surveys reveal among school children a much greater prevalence of physical defects than is commonly supposed. Estimates of the percentage of physical defects among children vary because of differences of opinion concerning their diagnosis and the extent to which they must exist in order to be so classified. Surveys indicate that approximately 65 per cent of all children need specialized treatment, such as eye examination, removal of hypertrophied adenoids or diseased tonsils, repair of teeth, or correction of malnutrition.

As a result of oversight and inability to secure home cooperation, many high-school graduates advance to college status burdened with serious physical defects which could have been eliminated or lessened. A nation-wide survey of the medical examinations of entering college students has substantiated this finding. Table I presents a summary of significant data, which reveal a strikingly high percentage of dental defects, malnutrition, and nasal obstruction.

The adverse influence of physical defects is revealed in several aspects of pupil growth. Although it is not always possible to demonstrate a cause and effect relationship, the presence of physical defects undoubtedly influences results of classroom activity.

Physical Defects and Intelligence

Superior intelligence is to some extent associated with individuals who are well developed and free from physical defects. Inferior intelligence often characterizes those who are poorly developed physically and who have physical defects. Individuals of extremely low mental capacity are almost invariably physically handicapped. Malformations and deformities are frequently found in such cases. The nature of the relationship between a good physique and intelligence has not been clearly defined, but it may be conjectured that an individual who is well developed physically possesses capacity for a highly developed neural organization.

Among the limitations of written tests used for measurement of intelligence is the fact that the conditions under which an individual takes an examination may affect his score. In the case of individuals who are totally blind or deaf, the conventional test is considered invalid, although factors other than physical disability are involved. Yet, within the range of less serious defects or of minor impairments of health, individuals respond in some measure in accordance with the way they feel. At certain times, for emotional reasons, they may be unable to work efficiently at a time-limited task. At other times a physical defect or ailment may considerably interfere with maximum performance.

There is no evidence that intelligence is significantly increased by correction of physical defects. However, effective use of potential ability is unquestionably improved when causes of fatigue, irritability, and insecurity are relieved or when the pupil is made more receptive to presentation of instructional material by correction of visual and auditory defects. As a result of removal of emotional and physical interference, classroom experiences become more meaningful.

Physical Defects and Achievement

Good physical condition is positively associated with scholastic achievement, the relationship being to a large extent accounted for by motivation and physical energy to perform given tasks. Physical defects are more frequently discovered among pupils who are low in achievement. Table II shows the percentages found in two groups of elementary-school children in Grades III and V. The failing group was suffering to a high degree from eye defects, ear, nose, and throat ailments, and malnutrition, whereas the passing group manifested fewer of these handicaps. Although the investigation is based upon data from unselected groups, its findings are consistent with earlier studies which suggest that physical defects frequently accompany low achievement.

TABLE II.—FREQUENCY OF PHYSICAL DEFECTS AND DISEASE IN A GROUP OF 1,000 CHILDREN WHO WERE FAILING IN SCHOOL SUBJECTS AND IN A GROUP OF 500 WHO WERE NOT FAILING *

Physical handicap	Percentage of group having physical defect or disease	
	Children who were failing	Children who were not failing
Defects and diseases of		
Eyes	59.0	21.0
Ear, nose, and throat	28.6	3.6
Circulatory system	8.0	2.0
Gastrointestinal tract	3.0	0.2
Nervous system	3.2	1.2
Endocrine system	3.2	2.6
Skin	4.1	2.2
Conditions of		
Allergy	2.0	0.6
Malnutrition	10.0	3.0

* EAMES, T. H., The relation of undiscovered or disregarded physical handicaps to learning, *Elem. Sch. J.*, 1945, 45: 516–519.

Among the physical defects that most commonly affect ability to participate successfully in classroom activities are those of *vision, hearing,* and *speech.* Pupils are usually unaware of such disabilities, since they are unaccustomed to perfect vision and hearing as means of comparison. Partial compensation, manifested in effort to locate themselves in the classroom where they may best see and hear, is frequent. It is important that sensory defects be recognized by the teacher since the pupils seldom reveal them voluntarily.

1. *Visual Defects.* The nearsighted pupil can usually manage close work at his seat but may behave unnaturally when attempting to read written material on a blackboard. He may crane his neck forward as though to lessen the distance or shield his eyes

to avoid extraneous reflected light. At his seat, his tendency is to shorten the usual viewing distance between his eyes and his book. He seldom suffers from headaches or eyestrain, since the eyes cannot be forced into unnatural adjustment for distant vision to the extent of causing strain.

The farsighted pupil sees distant objects more clearly in many cases than one with normal vision, and it is often difficult to convince him that his vision is abnormal. He cannot manage close work for long periods of time except by subjecting his eyes to strain. Headaches and eyestrain are common, since it is possible to force ocular accommodation beyond normal limits in the effort to see close material distinctly. The usual Snellen examination generally does not detect farsightedness. A farsighted pupil will often be observed holding his book at an extended distance from his eyes. There is a tendency to relieve strain periodically by gazing into space. In many cases he will study ineffectively rather than endure the strain of reading.

Both common types of eye defect are frequently accompanied by astigmatism, in which acuity of vision is impaired by the distorted form in which a visual image is perceived. Characteristic pupil behavior depends largely upon whether the correlated defect is nearsightedness or farsightedness; but since the eye is capable of attempting to compensate for astigmatism, a condition of strain is inevitable.

2. *Hearing.* Defective hearing is not difficult to detect if one is considering it specifically as explanation of inattention or inability to comprehend spoken words. On the other hand, it is easy to confuse the effect of impaired hearing with stupidity, indifference, or shyness. Defective hearing may be suspected in pupils who fail to answer when addressed, who frequently ask for repetition of questions, or who watch a speaker's lips attentively, as though lip-reading instead of hearing spoken words. Medical attention may sometimes eliminate specific causes without use of auditory aids, which are not tolerated by children; but since the defect is usually partial rather than complete deafness,

the problem is often solved by placing pupils with defective hearing where they can hear or can more easily learn lip reading.

3. *Speech Defects.* Individuals whose speech is defective may possess observable physical anomalies such as cleft palate, tongue-tie, or mouth abnormality. In many cases, however, a defect may result from neurological dysfunction. The relationship of speech abnormality to intelligence and scholastic achievement varies according to the type and seriousness of the defect.

Defective speech is more common among individuals of subnormal intelligence than among those of normal and superior intelligence, although it occurs on all levels of ability. Speech defects are often causally related to physical defects, which tend to multiply as lower intelligence levels are reached. Stutterers, however, seem to be excluded from this generalization. The evidence is that they are usually normal in intelligence.

Children with speech defects usually make slower progress in school than children with normal speech, even when intelligence levels are comparable. Such defects undoubtedly interfere with a child's ability to express himself and thus to reveal the extent of his knowledge. Differences in achievement, however, are less significant in the case of pupils who stutter. Defective speech is positively associated with inferior motor ability, a fact that suggests the importance of motor ability in the production of speech sounds.

In the past psychologists tended to attribute stuttering to efforts to change left-handedness. Existing evidence shows that it is unwise to generalize in this matter. Factors other than that of changing handedness frequently contribute to stuttering. The seriousness of a speech defect is related to the tendency of defective individuals to possess traits of personality such as emotional instability and lack of confidence. Speech difficulty and personal inadequacy may have a common basis.

The perplexing problem presented by the presence of a child who possesses a speech defect may be made less serious if the members of the class are taught to restrain their reactions to-

ward a classmate's peculiar manner of speaking. The teacher, during the absence of the child on an errand, may instruct the class to behave toward him as toward any other member of the group, reminding them that they must always allow him to complete what he has to say and not hurry him by supplying answers. The child should not be caused to feel essentially different from anyone else. He should be required to recite even though he may not volunteer. In no way should his defect be permitted to acquire value in securing his release from classroom obligations. Excess sympathy may encourage diminished effort to achieve or to maintain social status.

Influence of Physical Health upon Emotional and Social Behavior

Poor physical condition and physical defects are potential sources of personality difficulties. They remind the affected individual of his inferiority and thus affect relationships with others. Children who are lame, have to wear glasses, are weak from prolonged illness or malnutrition, or possess readily observable physical peculiarities are likely to feel that they are unlike normal children. When such personal problems are present, the individual may find solution in withdrawal, overcompensation, or self-pity. Inability to engage in certain types of sport limits opportunity to develop prestige and foster a sense of inadequacy. Tendencies toward overcompensation may be manifested in aggressive or antagonistic attitudes, and irritability may result from belief that physical inferiority requires defensive tactics.

Irregular rates of physical growth likewise cause children to have problems of adjustment. Boys and girls are sensitive about bodily characteristics that make them appear physically different from other members of their age and sex group. Their distress arises from inability to maintain successful performance in activities requiring physical size and strength or to win social acceptance. Many such conditions endanger the fulfillment of their basic urge for recognition and approval, and constitute a fertile source of frustration.

The seriousness of personal problems arising from awareness that they are physically atypical depends upon the strength of their basic urges and the extent to which physical differences deny such life satisfactions. In many cases children readily discover appropriate modes of adjustment and so do not become sensitive. In some cases, however, they manifest genuine anxiety because their goals of aspiration are frustrated by physical inadequacy.

During an investigation by Stolz and Stolz,[13] which led to discovery of common causes of distress among boys, the following physical manifestations were revealed:

Lack of size, particularly height
Fatness
Poor physique
Lack of muscular strength
Unusual facial features
Acne
Skin blemishes, scars
Unusual development in the nipple area
Bowed legs
Spinal curvature
Lack of shoulder breadth
Unusually large or small genitalia

The same investigation reveals that girls are frequently distressed because of

Tallness
Fatness
Facial features
General physical appearance
Tallness and heaviness
Smallness and heaviness
Eye glasses and strabismus
Thinness and small breasts
Late development
Acne
Hair
Tallness and thinness
Big legs
One short arm
Scar on face
Braces on back

Adolescent boys are particularly self-conscious about lack of height, whereas girls regard tallness and also extreme shortness as important social impediments. These differences from their

[13] STOLZ, H. R., and L. M. STOLZ, Adolescent problems related to somatic variation, p. 86, Chap. V in *N.S.S.E. 43d Yearbook, Adolescence,* 1944.

self-ideals are especially distressing in such mixed group activities as dancing in which convention favors pairing tall boys and short girls rather than short boys and tall girls. Increase in thickness of subcutaneous fat is more frequent in the case of girls and is a source of disturbance because of its relationship to attractiveness.

Manifestation of sexually inappropriate traits often results in disturbed feelings. Anxiety may arise from comparison made by an adolescent of his physical aspirations, as dictated by culture, and the characteristics that actually develop. Boys are inclined to be disturbed over excessive width of hips, narrowness of shoulders, and overdevelopment of tissue in the nipple areas. Such characteristics are suggestive of femininity. Girls are distressed by characteristics considered masculine, such as large hands, feet, and ankles, hair on the face, hairy arms, or massive skeletal build. The feeling that one possesses atypical characteristics sexually as a result of inappropriateness in physical development frequently creates permanent attitudes respecting security in the adult world.

Facial characteristics are commonly associated with traits of personality although without scientific basis. Adolescents are often distressed if conspicuous facial abnormalities are present. Girls are especially concerned about the possible effects of sores, moles, acne, freckles, or birthmarks, since these blemishes suggest incongruity with physical ideals. Difficulty in training the hair, large ears, protruding or receding lower jaws, and irregularly spaced front teeth aggravate the adolescent's difficulty in accepting himself or regarding himself as acceptable according to conventional cultural standards.

Individuals who possess a basis on which to feel physically handicapped are confronted with more problems than normal children. An important obligation of the school is to provide a wide variety of opportunity for self-expression in order to facilitate personal adjustment. Pupils should ordinarily be discouraged from activities in which they are at a physical disadvantage.

It is preferable to recommend activities in which success may be expected. Children need opportunity rather than pity. Their guidance should positively and constructively emphasize the abilities that they possess.

There are many ways to help individuals make adjustments for physical differences that cannot be eliminated. In some cases they may be persuaded that the importance of a peculiarity is exaggerated and that few persons attain physical perfection. Sometimes techniques of dress and care for the appearance that minimize the conspicuousness of an undesired condition may be suggested. Those who deal with large groups of children may often shift the basis of social acceptance to that of some compensating quality or usefulness, and thus minimize the importance often placed upon physical appearance.

Importance of Medical Supervision

Since the physical condition of children is importantly associated with safeguarding growth as a major educational aim, the total growth process must be under continuous observation. It is outside the role of the classroom teacher to make physical examinations, diagnose illness, or prescribe treatment for abnormalities discovered. It is, however, an important instructional function to maintain a continual analysis of classroom activity as a setting for total growth. There should be constant checking to observe whether conditions that contribute to normal growth are present. Safeguarding growth involves the obligation to act upon all evidence indicating the presence of conditions that impede growth.

Constant medical supervision is an imperative requirement if the school is to achieve maximum success in promoting the total well-being of children. It should not be overlooked that all growth represents an aspect of physical growth. A complete annual physical examination is fully as important to school aims as measurement of achievement or intelligence. Provision should be made for professional diagnosis of physical difficulties that arise during the school year. Accurate health records, including

physical measurements, are essential in order to determine whether physical growth is normally occurring. Many abnormal physical conditions require frequent observation in order to determine whether improvement is being realized.

Such a program obviously requires complete cooperation of the home and community. Discovery of physical defects must be followed by effort to relieve such conditions. In many cases parents who learn for the first time of an undesirable situation are cooperative in meeting their responsibility for securing medical treatment. Other parents, who cling to the belief that the school should deal with "book learning" and fail to understand the relationship between physical welfare and the broad outcomes of education, may reject the school's recommendation as interference. Certain families may lack means to provide medical treatment, and the problem then becomes one for the social agencies of the community. Many misconceptions concerning the role of the school will be lessened when viewpoints are reshaped and education comes to be regarded as the guidance of total growth.

PROBLEMS FOR DISCUSSION

1. State briefly some of the problems of a child, from his point of view, which result from the process of growth.
2. Criticize the statement frequently heard, "And suddenly *J.* grew up; he just developed overnight."
3. Discuss the significance of physical size to the child in his relationships with (*a*) child society and (*b*) adult society.
4. Trace the major developmental characteristics of the muscular, circulatory, genital, and nervous systems.
5. Evaluate the effects upon growth of (*a*) home conditions according to type of home, (*b*) school environment, (*c*) physical habits, (*d*) kinds of recreation, and (*e*) emotional influences—strain, sentimentality, shock, hazing, etc.

6. Describe the major characteristics of the growth spurt of adolescence with reference to (*a*) physiological forces believed operative in accelerating the growth rate and in retarding it upon attainment of sexual maturity and (*b*) sex differences with respect to growth rate following attainment of sexual maturity.
7. Discuss the social significance for the school of sex differences with respect to the timing of developmental characteristics during the preadolescent and the adolescent period.
8. In what respects are the following terms similar and different: *maturation, growth, development,* and *learning?* In what respects are all types of mental development related to physical development? Suggest a basis upon which learning, verbal as well as motor, may be identified with physical development.
9. Make suggestions whereby a teacher may aid the child in solving emotional problems resulting from (*a*) normal growth, (*b*) specific physical handicaps or abnormalities, and (*c*) marked deviation in growth from that of typical children.
10. Discuss common sensory handicaps with reference to (*a*) their nature and symptoms, (*b*) causes and possible treatment, (*c*) prevalence and distribution, and (*d*) effect upon school progress.
11. Outline a basis, citing cases if possible, for the modern point of view that children do *not* outgrow sensory defects or the effects of malnutrition.
12. Outline a health program appropriate to the needs of your school, considering (*a*) specific local problems, (*b*) goals desired, and (*c*) means available for attaining such goals.

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CHAPTER II

Scholastic Ability

To scold a child for a low scholastic mark is often as useless as to reprimand him for low stature. In both cases, the factors mainly responsible for inferiority may be entirely outside his control. Emphasis upon fixed standards of achievement has commonly favored the assumption that children are equally capable of satisfying scholastic requirements but fail to do so largely as a result of lack of application or inefficient study habits. A child who is scolded for laziness because of earning low grades is often actually industrious. The child with high marks is often praised for industry when in reality he has been satisfied with performance far below his potential capacity. Although variability in performance may be a result of undesirable attitudes toward school, pupil differences are frequently obscured through insistence upon inflexible standards. Children should never be thought of as standard raw material for classroom activity. The idea of uniform achievement standards is inconsistent with the significant differences among children.

It is fully as important to consider whether children *can* learn efficiently as whether they actually *do* learn efficiently. Appraisal of their capacity for schoolwork should inquire whether they have been properly provided with background facts and skills,

whether they are working under wholesome physical and emotional conditions, whether they possess appropriate methods for mastering subject matter, and whether they possess scholastic aptitude. Some individuals who are richly gifted with mechanical or social aptitude may singularly lack academic inclinations required for scholastic success.

If it were possible to eliminate the effect of all influences except that of potential capacity to learn, children would still vary in their responses to learning material. Such variability in capacity to learn indicates that classroom standards must take into account pupil differences. Children who are capable of superior performance should be presented with learning material of appropriate difficulty; children unable to satisfy superior standards should be given tasks from which they will derive greatest benefit. Problems related to the selection of types of learning material best suited to the needs of children require thorough examination of their learning ability. It is also important to consider the nature and extent to which various types of ability possessed by children may be differentiated.

Nature of Learning Ability

Use of the general intelligence test during the past three decades has tended to create the inaccurate belief that ability measured by such tests is synonymous with total mental ability. Thus in educational practice the term *intelligence* has become associated with the essential difference between rapid and slow learners, the term suggesting both the relative speed and the effectiveness with which individuals respond to a situation. A point of view now emerging is that the general intelligence test contributes most valuably to the measurement of the type of learning ability required in school subjects. Although ability required in various situations undoubtedly reflects the nature of an individual's total mental ability, it is important to observe that specific evidences of learning ability are only signs of total

intelligence and can by no means be regarded as accurate manifestations of any exact amount of intelligence.

For many years intelligence was regarded as raw, innate brain power and alertness, manifested in a complex of abilities and regarded as an unchanging hereditary characteristic. More recently, evidence derived from studies of mental growth and statistical analysis of different types of psychological test has considerably clarified the concept of intelligence and its measurement. Intelligence has now come to be regarded as a complex manifestation of mental growth, involving the interaction of hereditary and environmental forces. For practical purposes, it may be regarded as a composite of abilities, focused upon the varying demands of a problem-solving situation. Under favorable conditions this composite of abilities undergoes progressive development during the school years.

Tests of general intelligence measure many selected samples of demonstrable abilities required in the broad field of scholastic activity. It has been incorrectly assumed that their scope extends beyond this limitation and so reveals total mental ability. For the more intensive measurement of abilities required in limited areas, tests of special aptitude are needed.

In contrast to tests measuring general intelligence, achievement tests are indicative of learning ability in the fields which they cover, since they reveal the results of acquisition and designate the age or grade levels reached in actual attainment. Although they are not designed for use as tools of prediction or for the measurement of learning capacity, they undoubtedly reflect the amount and quality of ability manifested by the individual during the process of learning.

Measurement of Learning Ability

Methods of measuring general intelligence have remained fairly constant since the prototype of the modern psychological test was developed in 1908 by Binet. Every normal child was expected to manifest mental and motor abilities distinctive of

each successive year of age, discriminate with increasing accuracy between facts and between objects, perform increasingly complex numerical problems, and indicate progress toward mental maturity. Situations requiring definite responses were analyzed and finally arranged in ascending ranks of complexity paralleling chronological ages, thereby affording a basis for an objective scale. The guiding principle was that the materials should be confined to those with which a child might be expected to have become familiar through everyday experiences. But the required applications and responses should be those which he had not been called upon previously to make. If a child's responses were substantially correct through tests for 8-year-old children, his mental development might be considered normal for that age.

The revision of the Binet scale by Terman in 1916 constituted the first intensive American study of the measurement of mental ability. Two associated concepts simultaneously came into use. One was that of *mental age,* or M.A. A 10-year-old boy, who is successful only through tests for 8-year-old boys, is assigned a mental age of 8 years, whereby his mental ability is identified with that of 8-year-old children on whom the tests were standardized. If an individual's mental age and his chronological age coincide, he is considered normal from the standpoint of mental maturity.

The other concept in mental testing is that of the *intelligence quotient* or the I.Q., which is the ratio between mental age and chronological age. In practice, raw scores are converted into mental ages in terms of months. The M.A. of a 10-year-old boy may be 90 months and his *chronological age* or C.A. be 120 months. By dividing 90 by 120, the ratio is found to be .75 or, since I.Q.'s are expressed in multiples of 100 in order to eliminate decimal points, 75. The M.A. is a measure of mental maturity without reference to the length of time a child has lived, whereas his I.Q. is the relationship of mental to chronological age. If the

I.Q. is to remain constant, the mental age must advance in proportion to chronological age.

For the purpose of obtaining substantially the same information at one examining period concerning many individuals but with greater economy of time and effort than is possible with the Stanford Revision of the Binet scale, which is individually administered, numerous group tests have been constructed. The first of this type, the Army Alpha and the Army Beta, developed in 1917, were designed to measure mental ability of army recruits. The Army Alpha was intended for those who were literate, whereas the nonverbal material of the Army Beta made measurement possible in the case of those whose educational background was limited.

In the process of standardizing group tests, children between the ages of 6 to 18 have been most frequently used as subjects. As yet little is known regarding the intelligence of the adult population, children not in school, or those in atypical school environments. Therefore, the validity of conventional instruments for measuring mental capacity of such individuals is dubious. During late secondary-school years unavoidable selectivity of population is evident, since superior children tend to complete high school and the less capable tend to discontinue their education or to seek occupations. Thus during late adolescence or adulthood the results of general intelligence tests may not be highly dependable. For school purposes, however, tests standardized on individuals who are subject to similar school and home influences are valid indicators of scholastic promise.

Analysis of test results leads to the discovery that certain types of test item are not answered with consistent success. Some individuals, for example, do better in the case of items stressing language ability, whereas others find mathematical operations easier. This observation evokes speculation concerning the nature of abilities. Are abilities general or specific? Do current psychological tests actually measure intelligence as such? Or do the obtained measures reflect, not general ability, but special

abilities? If special abilities exist, can they be isolated and their unitary character demonstrated?

Our purpose does not require detailed discussion of the psychological controversy concerning the factors entering into ability. One school of thought believes intellectual action to be dominated by a general factor present in most mental activity and also special distinctive abilities for differentiated activities. The presence of group factors is also suggested, with the assumption that such factors operate in many but not in all activities.

In a statistical process referred to as "factor analysis," effort is made to differentiate intelligence more precisely into its component factors. Briefly, the process involves investigating types of test items with reference to their correlation. If success in one type of response is accompanied by similar success in another, similar ability is believed to be present in both. But if little or no relationship is discovered, it may be believed that each part of the test involves distinct types of ability. The use of this technique has suggested a field for further investigation and has demonstrated possibilities in a type of test capable of analyzing and differentiating abilities.

Application of factor-analysis techniques has made it possible to differentiate abilities related to memory, language, word fluency, perceptual speed, number, deduction, induction, and spatial ability. It is not certain whether specialized abilities exist as unitary characteristics. The complex activity involved in schoolwork demonstrates aspects of ability in which some children excel others.

The tendency in measurement of general scholastic aptitude is toward the use of analytic types of test, which are designed to determine mental maturity in several theoretical or practically determined abilities. Scores made on parts of such tests may be graphically presented in the form of a profile, as Fig. 9 illustrates.[1] Such a profile with scores in strong and weak abilities

[1] SULLIVAN, E. F., W. W. CLARK, and E. W. TIEGS, California Test of Mental Maturity, California Test Bureau, Los Angeles, 1939.

makes it possible to compare, in pictorial as well as numerical form, a child's rating in memory, spatial relationships, reasoning,

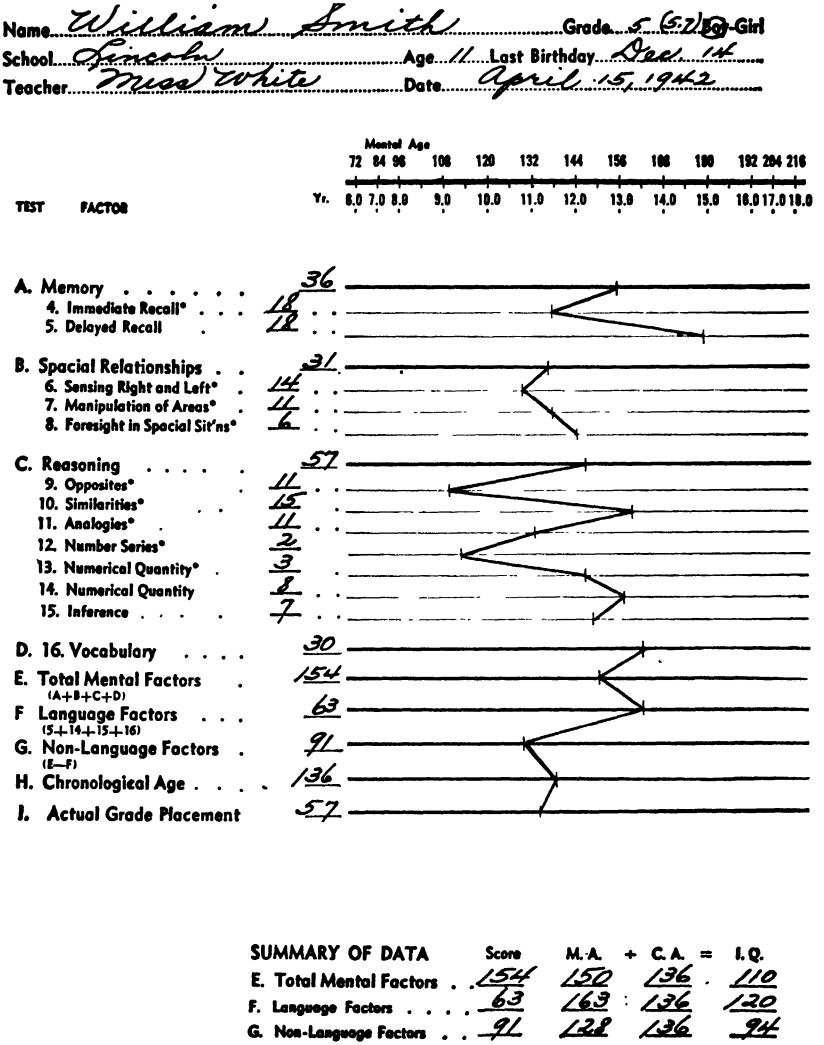


FIG. 9.—Intelligence profile of an analytic type of intelligence test.

vocabulary, language, and certain other abilities. Such abilities obviously possess varying degrees of significance in learning different types of subject matter.

The results of tests of mental ability depend upon certain degrees of scholastic achievement. They would scarcely be valid for a child who has had little schooling. Although they are concerned principally with the measurement of potential learning ability, they actually overlap achievement. The essential difference, as already suggested, is that the intelligence test is designed to measure capacity for future mental work, whereas the achievement test is concerned with work accomplished. Both obviously share the individual's background of experience and training.

General intelligence tests have tended to stress the measurement of higher mental processes, emphasizing the learner's ability to react to verbal presentation of material. They thus tend to be heavily weighted with language responses as distinguished from motor reactions. Belief that tests of general intelligence should be measures of ability to think by means of symbols has been generally accepted in constructing tests for use in the schools. Emphasis upon abstractions and symbols has made such tests particularly useful in predicting scholastic efficiency for the usual type of verbal material. The more closely test materials correspond to materials and mental processes involved in actual learning situations, the greater their predictive value. Intelligence tests that stress the measurement of verbal ability correlate significantly with verbal subject matter; those which minimize the verbal factor show low correlation.

Range of Mental Ability

Intellectual traits are normally displayed as a spread of frequency having a high concentration of measures at the middle of the curve of distribution and lower frequencies of occurrence at the extremes. A sample distribution of intelligence test scores, as illustrated in Fig. 10,[2] is typical in the case of a large number

[2] Thorndike, E. L., *The Measurement of Intelligence*, p. 545, Bureau of Publications, Teachers College, Columbia University, New York, 1927.

of individuals. Superimposed upon this curve of scores of college freshmen is the smooth probability curve, which shows the theoretical form of distribution curve to be expected. In a large unselected population, the central tendency of the I.Q. is 100, as test construction is based upon the conformity of mental with chronological age in the normal individual during the school years.

Deviation from the "normal" extends in the direction of upper limits, where the I.Q. is greater than 100, and of lower limits,

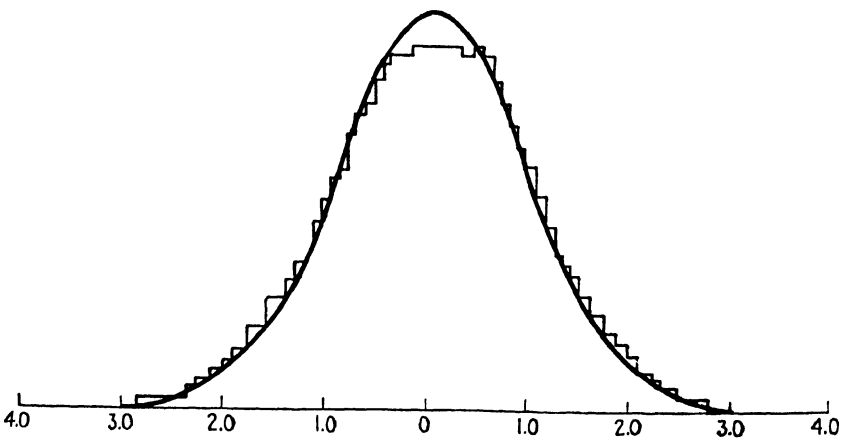


FIG. 10.—Distribution of mental test scores.

where the I.Q. is less than 100. In general, the greater the number of individuals included in a distribution, the more closely the curve approaches theoretical expectancy. An irregular curve often results when intelligence quotients for a small group are plotted.

The distribution of intelligence quotients of a group upon which a recent revision of the Stanford Binet scales was standardized is presented in Table III. This table also shows the descriptive terms applicable to various levels of intelligence. The "normal" group includes individuals with I.Q.'s ranging from 90 to 109, who constitute 46.8 per cent of the total population. The "high average" and "low average" groups are found to con-

TABLE III.—CLASSIFICATION OF INTELLIGENCE QUOTIENTS *

Classification	I.Q.	Percentage of total
Very superior	160–169	0.03
	150–159	0.2
	140–149	1.1
Superior	130–139	3.1
	120–129	8.2
High average	110–119	18.1
Normal or average	100–109	23.8
	90–99	23.0
Low average	80–89	14.5
Borderline defective	70–79	5.6
Mentally defective	60–69	2.0
	50–59	0.4
	40–49	0.2
	30–39	0.03

* MERRILL, M. A., The significance of the I.Q.'s on the Revised Stanford Binet Scales, *J. Educ. Psychol.*, 1938, 29: 641–651.

stitute 18.1 and 14.5 per cent, respectively, a fact illustrating quantitative decline on either side of the central tendency. In Fig. 11 [3] the same data are presented graphically.

Other terms used to describe the various levels of intelligence refer to the highest I.Q. group as "genius" and to the progressively inferior groups as "moron," "imbecile," and "idiot." These terms, however, have acquired an unfortunate social and occupational connotation and suggest more than intelligence level. In the typical classroom, above the early grades, individuals having I.Q.'s of 60 and below have been largely eliminated because of obvious incapacity for schoolwork in classes with normal individuals. In most schools, individuals of such low rating are not accepted.

[3] TERMAN, L. M., and M. A. MERRILL, *Measuring Intelligence*, p. 373, Houghton Mifflin Company, Boston, 1937.

Variation from the typical curve of distribution is frequently found. Causes for such irregularity often may be discovered not only in the size but in the composition of the population. The community, for example, may show well-defined variation in socioeconomic status. Many pupils may come from families employed at heavy manual work or low-grade factory jobs and also families engaged in professional and highly skilled occupations,

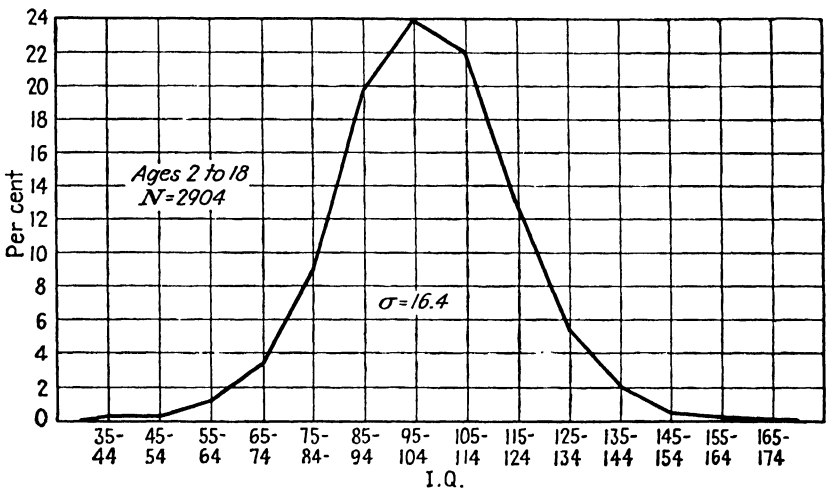


FIG. 11.—Intelligence distribution curve.

with a relatively small representation of intermediate socioeconomic levels. Although designation of causes is at best a controversial issue, it is frequently observed that high I.Q.'s are associated with superior socioeconomic levels and low I.Q.'s with inferior levels.

CHANGES WITH AGE

Although mental ability increases with age, numerous factors create difficulty in tracing the rate of growth. An obvious limitation is the necessity of depending for knowledge of mental growth upon data obtained through use of conventional types of objective measurement. Since such measurements are standardized upon children who are advancing through their school years,

they reflect typical capacity for satisfying requirements at various educational levels.

The data that general intelligence tests afford serve only to demonstrate that during school years children grow at a fairly uniform rate in capacity to satisfy increasingly rigorous demands for learning as school requirements become increasingly complex. They also suggest that the requirements of the typical curriculum are scaled to the developing learning ability of the typical child. Variability in rate of gain in intelligence occurs during the preschool period, late adolescence, and adulthood, when opportunities for standardization are less numerous. During late adolescence and adulthood the rate becomes especially difficult to determine.

Imperfection and inappropriateness of measuring instruments make tracing the rate of mental development considerably more difficult than that of physical growth. Measurement of physical change often may be confirmed by observation based on external comparisons, but measurement of mental ability may not be verified so readily. Much difficulty results from the fact that a child's learning ability at an early age differs in quality from that of a later age, even when results of measurement are expressed in terms of similar units. Differently organized patterns of ability constantly appear as various maturational levels are reached. From one age level to another, the individual displays the same solid front; but the elements in this composition vary.

A young child's ability is developed predominantly through narrow experiences to which he makes direct routine responses. With advance in age, he has broader experiences in which he learns to analyze various elements of a situation through abstraction. When he begins to generalize, he may be said to be acquiring "higher abilities," which transfer to new learning situations. Certain elements in the totality of learning ability probably do not become operative until appropriate stages of growth have been reached. Thus learning ability which general intelligence tests measure is indeterminate. Whether complex abilities might

develop more rapidly at earlier ages if the educative process should stress such goals as well as it now stresses those involving factual learning is a pertinent question.

Individuals may be expected to mature with respect to kinds as well as degrees of ability. Various types of ability develop gradually, even though they appear to emerge suddenly at successive stages. Learning ability in the case of young children

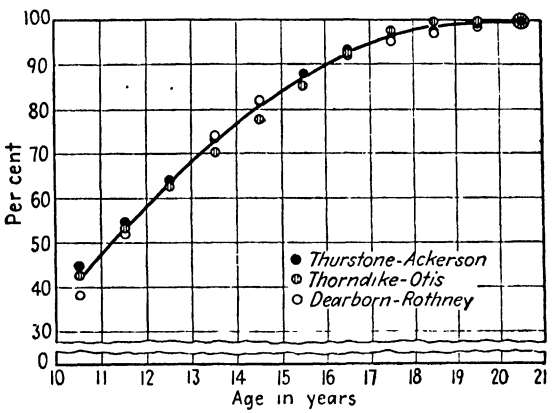


FIG. 12.—Curves of mental growth.

may include unobserved development in capacity for simple problem solving as well as manifested ability to acquire facts. With increasing maturity, improvement in various types of ability may be expected. The cumulative effect of meaningful experiences is especially operative in the case of bright children and results in greater rapidity in the development of abilities related to abstract thinking.

General intelligence tests afford little evidence concerning differences in rates of improvement of different kinds of ability, since their aim is especially concerned with general aspects of learning ability. The curves of mental growth illustrate quantitative measurement of general learning ability.

The curves of Fig. 12 [4] are based upon composite data derived

[4] JONES, H. E., and H. S. CONRAD, Mental development in adolescence, p. 153, Chap. VIII in *N.S.S.E. 43d Yearbook, Adolescence,* 1944.

from the use of different types of general intelligence test, the findings of which are similar. They suggest that children attain 50 per cent of adult status at about the eleventh year, and that adult status is not fully achieved until somewhat past the twentieth year. Development during school years is fairly uniform. During this period, children are subjected to similar school in-

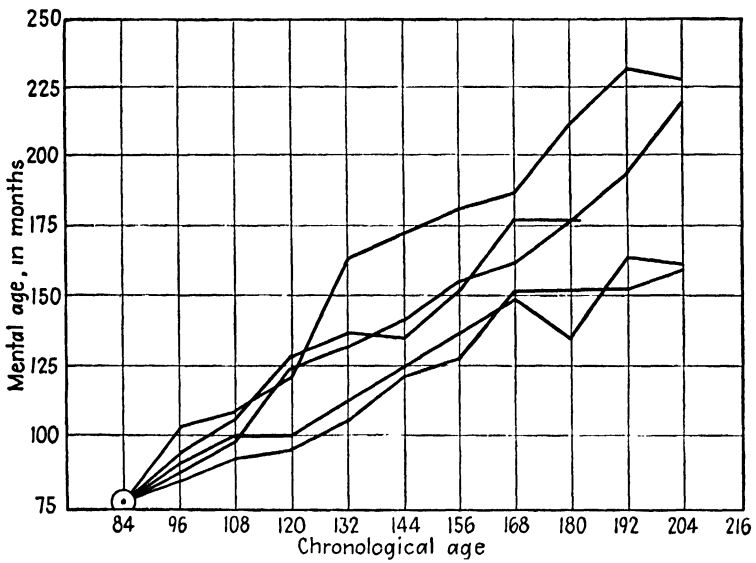


FIG. 13.—Individual growth curves (boys).

fluences and grow mentally with regularly accelerated rates in capacity to deal with increasingly complex school materials. Conventional tests yield data of questionable value for the upper limits of mental growth. Some investigators place the end of the mental growth period at as low an age as about 14 years; others contend that it increases up to and even beyond 22 years.

The principal value of the general intelligence test is in its use to detect individual variation in learning ability. Since relative rates of intellectual growth tend to remain fairly constant from one age level to another, it is possible to predict on the basis of the demonstrated ability of a young child the approximate extent of his ability during later years.

Individual growth curves, nevertheless, may be expected to deviate from average age trends. Figure 13 [5] shows the variability of mental growth curves in the case of five boys. Each boy had at the age of 7 (84 months) an I.Q. of 82, but at the age of 17 (204 months) the highest and lowest boys were 66 mental months apart. Each boy took the same tests throughout

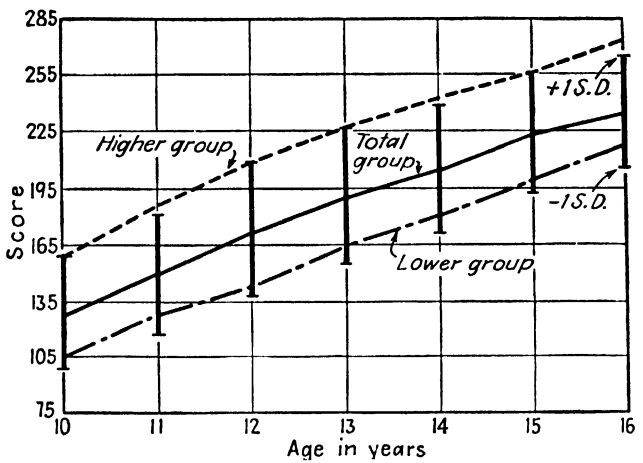


FIG. 14.—Mental growth of bright and dull.

the investigation, the differences in results being comparable for the various age levels.

Although there are wide individual variations, relative constancy for group averages appears to be the rule. The question of constancy is of considerable interest when comparing the rates of growth of bright and dull pupils. What are the differences with respect to rate in the two extreme types of learner? If initial divergences are not too great, the tendency seems to be for the groups to develop in a parallel direction, as shown in Fig. 14.[6]

[5] DEARBORN, W. F., and J. W. M. ROTHNEY, *Predicting the Child's Development,* p. 329, Sci-Art Publishers, Cambridge, Mass., 1941.

[6] FREEMAN, F. N., and C. D. FLORY, Growth in intellectual ability as measured by repeated tests, Monographs, Society for Research in Child Development, Vol. II, No. 2, 1937.

individuals in this study constitute a selected group, and an approximately parallel growth is observed. Evidence from other studies, however, indicates a tendency for the bright and the dull to draw farther apart. Except in the case of the feeble-minded, with whom typical schools are not concerned, no foundation exists for the belief that mental growth of the dull is arrested at an early age. On the contrary, there is reason to believe that potentialities of some relatively dull pupils may be brought closer to realization as a result of continued educational training.

Stability of the I.Q.

The deterministic point of view that intelligence is a native characteristic has tended to place limitations on expectation of changes in the I.Q. Yet evidence for variability of the I.Q. is too convincing to be explained on the basis of errors in measurement. Contrary to general understanding, Binet in 1911 modified his initial belief by declaring that intelligence was affected by environment, might well be scrutinized for distinct measurable elements, and was susceptible to improvement.

Considerable controversy has centered on the relative effects of heredity and environment. Although it is clear that mental ability as measured by tests takes into account a relatively stable environment, the problem may be approached from another angle. Is environment responsible for fluctuations in the rate of mental growth, and to what extent may a favorable environment improve the I.Q.?

Many studies of the effect of environment have demonstrated significant progressive decline of the I.Q. of children reared in rural mountain communities as compared with a tendency toward constancy of the I.Q. of children reared in relatively normal environments. Deterioration of the I.Q. has been found in children placed in orphanages at early ages, where the average I.Q.'s decreased progressively with increased length of residence. Negro children who move from Southern to Northern cities soon make improvement upon intelligence tests. Children from homes

of superior socioeconomic levels tend to have higher I.Q.'s than those from homes of inferior levels.

Those who believe in extraordinary effects of environment hold that a change in experience is a causal factor in the variability of mental growth. Others who search for hereditary causes, question, with some justification, the dependability of measuring instruments, or maintain that change in environment has affected simply the background that underlies the learner's ability to make a normal performance on intelligence tests. Interaction of the two determining factors is the most satisfying explanation. It is significant that changes in intelligence-test scores follow extreme changes in educational and social environments.

The apparent conflict arises from a tendency to regard heredity and environment as independent forces. Although the two act inseparably, confusion exists concerning the method by which the allied action takes place. Environment does not affect the original mental inheritance of the child, but, rather, the cumulative results, at a given moment, of interaction of nature and nurture. Both forces are constantly intermingled; neither acts independently upon a static individual.

A boy's brilliant performance in arithmetic may not be fully explained by the fact that he comes from a family of brilliant people, none of whom ever experienced difficulty with arithmetic. We may not say that it was purely the mathematical influence of his parents upon his intellectual inclination, although he doubtless benefited from home environment. The explanation probably lies in the fortunate intermingling of forces. Heredity alone cannot achieve its ultimate possible success without optimum environment, nor can the best of environment compensate for a limited ability.

Control over environment is within our reach. Poor environment, if permitted sufficient time to allow its cumulative effects to be felt, may depress the I.Q., especially in the case of young children whose experiences are narrow and limited. Measurement of the result of environment is complicated by incidental in-

fluences, the effects of which are difficult to control. Among these variable influences are motivation, emotional and social adjustment, opportunity for incidental learning and self-expression, and influence of friends and companions. Many of these forces operate apart from the home and the school. A boy may casually visit with a returned sailor and, learning about exciting experiences in distant lands from one who is not trying to teach a lesson, discover through this incidental influence that his geography book is interesting too.

Intelligence tests measure principally the intermingling of native endowment and the effects of schooling. The intellectual contribution of schools during the past 25 years furnishes the basic array of material constituting the assumed experiences of the learner. Intelligence tests are standardized on run-of-the-mill children, whose school training represents traditional emphasis upon acquisition of accumulated facts and information and whose incidental experiences are similar. Results of current intelligence tests, therefore, are highly indicative of the present state of education. Learning potentialities discovered by such tests simply mean that a child with an I.Q. of 100 may be expected to do as well in school as the normal child in a typical American school environment. It may be inferred that school environment, if consistently improved by greater emphasis upon mental factors that are implicit in the I.Q., may lead to its improvement.

Measuring Special Abilities

It is not expected that general intelligence tests will cover equally well all areas of ability. At best, they indicate satisfactorily the range of abilities necessary in academic success and differentiate between bright and dull pupils with reference to expected ultimate achievement. In their extensive survey, two important limitations must be recognized. First, they do not explore specific subject-matter fields intensively. Second, they do not cover such fields as music, art, shopwork, mechanical ability,

and others, in which the emphasis is somewhat vocational and the abilities related to motor or mechanical activity.

A number of successful subject prognostic tests have been prepared, covering algebra, foreign languages, and mathematics. Their approach tends to be more highly exploratory in fields of preparation for such subjects than is the case with general intelligence tests, in which school achievement is minimized. In such prognostic tests, there is presented a series of test lessons based upon certain facts that are peculiarly pertinent to a given field. In a foreign-language test, a pupil's working knowledge of grammar and his ability to express himself in English is measured incidentally. The emphasis in such a test is upon his ability, when given a group of foreign words and their meanings, to assemble such words into sentences in the language or to translate a sentence into English. In short, his ability is explored somewhat intensively in operations typical of those to be expected in a foreign-language course, but on a simple, elementary basis.

Prognostic tests do not attempt to differentiate abilities involved beyond the point of sampling some of the types of activity that a given subject requires. The purpose is simply to find out how a pupil, before he is burdened with the task of learning new materials, might respond in situations typical of the subject. His adaptability to the subject is inferred from his success in performance of sample operations.

Such tests are of considerable value as a means of determining whether certain subjects should be recommended. Fundamentally, the aim is to detect pupil differences and thus to avert failure at the start. If a pupil appears likely to be a misfit in geometry but to be a good risk in general biology, the latter course is a more appropriate choice for him.

In the elementary grades, prognostic tests have been developed to determine readiness for reading and arithmetic. It is important that such subjects should not be introduced to young children in advance of their appropriate maturity. To push children beyond their degree of maturity is a waste of time and effort.

Attempts to hasten, through training, the emergence of such states of readiness is to defy the laws of growth.

Prognostic test results should not be considered the sole evidence; they should be used together with the diagnostic data obtained from a general intelligence test. No single test may be expected to tell an adequate story. A prognostic test, through its different approach, serves as a double check upon potentiality for learning. The relationship between scores of prognostic tests and tests of general intelligence is usually positive and high. Prognostic tests, however, generally correlate more closely with achievement in a given subject than do general intelligence tests because they measure intensively the specific abilities required by a subject.

Special aptitude tests have also been developed for the purpose of measuring learning ability in fields such as music, art, or shopwork, in which the special abilities are predominantly nonverbal. Such tests are of particular value in determining the appropriateness of various vocational fields. Their general approach is to explore the background of knowledge and skill and to predict the individual's capacity to profit by further training.

The classroom teacher usually does not have available the necessary testing material for investigating evidences of special ability observed in pupils. But it is important to know that such objective measurement may supplement the data obtained through the general intelligence test and informal observation of pupils' interests and abilities. Care must be taken to distinguish between special aptitude and manifestation of interest. Many pupils who are interested in work with tools in the home or in the school shop may possess valuable abilities but eventually prove poor material for training in engineering. Similarly, pupils who are interested in music may not actually possess sufficient aptitude for a musical career.

It is uncertain how or when special aptitudes emerge or whether they are necessarily permanent. Certain conditions favor the appearance of an aptitude at a given time, but lack of

training may cause it to remain undeveloped. Aptitude for vocal music or drawing is frequently undeveloped for lack of opportunity and training. We do not know whether special abilities overlap those measured by general intelligence tests. Certain nonverbal activities such as shopwork may require group factors of ability that are applicable in such verbalized fields as mathematics. Mechanical and motor ability may be related in various ways to verbal ability. Likewise, it is not certain how closely intelligence is related to special abilities.

Recognizing Pupil Differences

In time, pupils reveal much about themselves in the character of their work, their interest in classroom activities, and their general reactions toward subject matter. A teacher who studies the individual characteristics of pupils can gradually form fairly valid opinions as to who is bright and who is dull.

In waiting for the teacher's personal judgment to mature, however, considerable time may be lost before the classroom program can be adjusted to the different levels of individual ability that are represented. Also, teacher judgment is frequently erroneous and may never reach a true estimate of pupil potentiality. Often a pupil with verbal facility succeeds in creating an impression that work of superior quality may be expected, whereas a more reticent individual may be underestimated.

It would be unfair to the pupil to appraise his mental capacity upon a single source of evidence. The more carefully a pupil's background is explored, the greater will be the probability that his needs will be understood and personalized relationships established. Early differentiation of ability makes it possible to provide for the least capable pupils, as well as to guide and assist the more able pupils to achieve high quality in their work. Teaching is easier and more efficient when the instructor is able to set an appropriate pace of achievement during the first few class meetings.

Judicious Use of Intelligence Test Scores

The practice of permitting pupils to learn their individual intelligence-test scores is unwise, because of prevailing misconceptions concerning the significance of the I.Q. There is no more reason that a pupil should be given this information than that a physician should give patients detailed professional findings. It is especially undesirable to inform a pupil that he has a low I.Q. If a pupil is aware that his I.Q. is subnormal, he may gain the impression that he is inferior, from common knowledge that feeble-mindedness is associated with low I.Q.'s. The results may be far-reaching in effects upon his emotional and social development as well as upon his work in the classroom. The positive approach is to omit any reference to intelligence. The slow learner should not be permitted to feel that he is being given easy tasks.

Similarly, an individual in the upper ranges of intelligence, whether he knows his I.Q. or not, may content himself with meeting minimum requirements. Teachers are prone to be indifferent toward superior individuals. They erect their intellectual hurdles for typical pupils, placing pressure on the dullard rather than stimulating superior pupils to reach their potential limits of achievement.

Tactfulness is necessary in enabling the slow learner to participate in classroom activities in such a way as to maintain his personal dignity. It is likewise important to be tactful with a rapid learner in order to give him no grounds for egotism or an excessively self-satisfied feeling. Yet, it is important not to challenge his brightness by suggesting that he may not be so bright as he thinks he is.

Intelligence Tests as Indicators of Scholastic Success

Intelligence tests do not enjoy a close relationship with school achievement because they represent potential learning ability only. They offer no guarantee of the manner in which such po-

tentiality will be used. In fact, an extremely bright pupil may, under some methods of teaching, find the work boring and perform in a manner inconsistent with the promise of his mental ability. Unless properly regulated, pupil achievement and mental ability may not attain their expected correlation. Thus it may often happen that a pupil of low average intelligence may make greater gains in achievement than individuals of high average or superior mental ability. The problem is best solved by getting each pupil up to flexible standards representing the maximum achievement that his mental ability warrants.

Recognizing Differences through Different Types of Response

Subject matter in a given course may readily become simply something to learn, with little attention to the best possible ways of making it serve the learner. Much more can be done with subject matter in most classes than cultivating the relatively simple ability of memorizing and recalling facts and principles.

In almost every subject, there are opportunities for the practice of abilities of a higher order than that of being able to recall or reproduce the materials of a textbook. There is considerable evidence in support of two significant facts concerning higher abilities. The first is that they appear to be retained by pupils over longer periods with less loss than the ability to recall detailed facts. The second is that such abilities transfer more readily to other types of subject matter. To the extent that subject matter permits, these principles should be kept in mind when differentiating learning materials for presentation to heterogeneous groups.

In making classroom materials appropriate for all types of learner, it is necessary to establish definite policies. Differentiation in terms of quantity of work is undesirable. It simply extends the stress on factual learning into the higher intelligence groups, by requiring better-than-average pupils to do more work.

A sounder plan is to provide opportunity for gradually increased enrichment of the course content by minimizing factual

requirements in the case of the bright and by planning for them valuable practice in the higher abilities. No pupil need be distinctly conscious that he is being treated as bright or dull, and subject matter may present a challenge to pupils of all mental levels. The burden of work may also be evenly distributed, and all pupils may expend in participation about the same amount of time and effort.

The important first step is the determination of types of response to be expected of pupils of various abilities. This step should involve more than casual decision as to how best to divide the textbook in such a way as to cover a body of material in a given time. Trying to think of ways in which pupils will be benefited as a result of a course should bring to mind some of the types of response for which the content may be used.

Once the variety of responses that a course may require has been determined, the next step is the arrangement of material, so that as the class is organized, definite tasks may be provided for each of the grades of ability in the group. This situation may be simplified if the pupils are classified as rapid, average, and slow learners. Actually, in a class of 30 pupils there are 30 different individuals, but from a practical standpoint the three groups are representative of three levels of learning: (1) memorization, (2) application of principles, and (3) inference.[7]

Of the slow learner little may be expected except mastery of facts and skills, and the learning of these may require much carefully supervised drill. Gaps in preparation are inevitable, especially in work habits and transferable abilities. In arithmetic, a pupil may gain more by practice in addition and subtraction than by struggling with complex fractions.

In order to enable him, however, to maintain status in the group, he may be given occasional special tasks which no other pupils in the class are expected to cover in their work. His re-

[7] JUDD, C. H., *Education as Cultivation of the Higher Mental Processes*, The Macmillan Company, New York, 1936.

ports on an individual problem or project may benefit him as a result of the feeling of personal accomplishment as well as from the satisfaction of having maintained status in the group. When work by a slow learner actually lacks intrinsic merit, the teacher may reward neatness, cooperation, and diligence. If such a pupil contributes something, even if only in having consistently neat and well-arranged written work, he is not deprived of satisfaction of participation and may feel that he too "belongs." In the case of the slow learner evidences should be sought of special abilities, especially if such discovery might make it possible for a slow learner to make a distinctively personal contribution.

The slow learner's work, especially, should be related to his own close, personal experiences both in and out of class to lessen the burden on his ability to do abstract thinking. It makes sense to him to be asked to measure a garage and calculate a floor area. In the practical case, he benefits from using an actual measuring scale, and he can associate the results with reality.

When differences in individual learning ability are recognized and lesson plans and teaching procedures are laid out accordingly, the average learner may be expected to master the factual basis of the course with much less effort, and less time may be needed for drill. Each learner may be found to possess some attainment in abilities that will carry him further than simply memorizing the facts of a course. Close check may be kept of the rapidity of his gain in mastery, and as he develops and improves he may become increasingly capable of doing work of a reasonable degree of complexity and making applications of principles. Such provisions may take the form of a fairly difficult verbal problem in arithmetic or algebra, written work in English to demonstrate ability to apply rules of grammar, original propositions in geometry, special topics in current history, and wider range of reading for increase in information as well as for application of reading skills.

Possibilities differ with subjects, but the guiding principle should be that of requiring activity in learning on a level higher

than that of simply having the learner repeat to the teacher the information that he has memorized. It may be expected that many facts acquired by slow learners only through persistent drill may come to the average learner in the form of incidental learning.

The rapid learner may often absorb essential facts as rapidly as they are presented to him, since many applications immediately suggest themselves as the material is discussed. The rapid learner is also likely to have mastered many techniques of learning that extend beyond memorization. He may be given types of work that require the discovery for himself of some unrevealed basic fact or principle. He may also be given a body of facts and be asked to study them and report upon the conclusions that may be drawn upon the basis of the evidence.

The apparent laziness of rapid learners is frequently attributable to lack of opportunity to make types of response that afford them satisfaction. Such learners often require recognition of their personal initiative when they voluntarily seek to derive personal meaning from subject matter. They likewise require freedom to express themselves in their own manner. In the case of rapid learners who display little initiative, it may be necessary to indicate some of the ways in which zeal for discovery may be utilized. On higher levels of ability, there are greater possibilities of utilizing personal meaning to stimulate effort.

Recognizing Differences through Testing

Test situations should be carefully formulated with reference to what is expected of the learner and should measure attainment in the different abilities outlined as instructional objectives. One group of test situations requiring recall may be chosen. Another group may require application of principles, whereas a third may present combinations of facts and require inferences to be made. No one item or group of items should have more than one aim or stress more than a single ability.

Beyond minimum requirements, it may be left optional with the slow learner whether he will attempt items related to application of principles or inferences. Other learners should be directed to attempt fewer samplings of factual matter but be required to make responses to the more complex items. In all cases, each pupil may be encouraged to examine the types of item set for all objectives and go beyond those assigned, upon discovery that he can make successful responses. While recognizing the existence of different ability levels within a class, the teacher should provide for the greatest flexibility in allowing pupils to move from group to group if their ability permits.

Recognizing Differences in Appraising Progress

Appraisal of pupils has always been the basis of many a perplexing situation at the end of a course. The real question often concerns the method of dealing with pupils who have done their best with limited ability and are still below standard according to traditional levels of achievement. It is pertinent to inquire whether we have been solicitous enough about superior individuals who have not lived up to their possibilities and who are failures in the true sense of the word. The use made of achievement standards should be reexamined with a view of determining whether they are correlated with what is known about mental growth or centered on textbook mastery that may not be related to instructional goals.

To advocate promotion for everyone cannot be the unqualified solution of the problem of the slow learner, for the question of accomplishment is then ignored. To base promotion upon attainment of minimum standards of achievement penalizes the dull individual, who may have done all that he has been capable of doing, and overrewards the bright individual, who has scarcely exerted himself in meeting minimum requirements.

If the standard of passing is based upon industry, the same equivocal situation obtains. Some individuals would find it necessary to work hard for acceptable grades. Knowledge of

differences in mental ability suggests that a partial answer at least may be found in comparing the achievement that a pupil makes with his mental ability. Different qualitative standards may be set for the bright and the dull. Scholastic honors too often go to the bright alone; the dull are denied recognition. If the dull individual has responded properly to demands made of him in the learning situation, has made diligent effort to learn materials on the lowest level of learning, and has made fullest use possible of his ability, we may say either that he deserves to pass the course or to be studied with reference to a scholastic readjustment appropriate for his case. Superior individuals should not be rewarded so liberally for work on inferior levels of learning but should be required to demonstrate greater facility in high abilities. If we give special consideration to the dull, we should require the bright to measure up to their individual potentialities as well.

Challenge of the I.Q.

Evidence still favors belief that, under relatively constant environmental conditions throughout the school years, the I.Q. remains relatively constant. Also, the measurement of general intelligence with existing tests is most valid for children between 6 and 18 years of age. Nevertheless, the types of ability that the general intelligence test appears to measure encourage one to speculate whether purposeful training through the school years might not result in general improvement of the I.Q.

It is possible that we do not use subject matter to its fullest extent and that the I.Q. represents incidental, not directed, mental growth. Our teaching tends toward an authoritarian point of view. Children learn as many specific facts as we give them, and these facts are accepted as true and infallible. Rarely do we encourage questioning of the material studied. Citing the printed page often takes the place of reasoned argument and discussion.

Higher abilities, such as ability to solve problems, to make applications, and to generalize, should not wait for the attainment of a certain age or grade level before receiving emphasis. Evidence from experimental studies indicates that such abilities normally begin to take form at an early age. Problems of appropriate complexity may be handled successfully by children of the first grade. Habits of thinking for themselves should be encouraged. Childhood thinking is, of course, largely in concrete terms and little abstract reasoning may be expected. We should be prepared, however, to meet the emerging evidences of mental growth by providing opportunities for training in higher abilities.

Full understanding of the I.Q. should present a compelling challenge to educators to reassess subject matter in terms of how it may contribute to the growth of intelligence. Cultivation of abilities above the level of memorization and recall of facts may be a means of stimulating mental growth more successfully than prevailing learning methods permit. The challenge of the I.Q. demands more than skill of the teacher in securing adequate memorization of material. It requires foresight in formulating problems requiring the use of facts, discovering supplementary materials, and providing novel situations that require initiative in applying information.

PROBLEMS FOR DISCUSSION

1. Criticize the popular impression that the general intelligence test may be used to measure an individual's total mental ability. What other types of test may often be used more advantageously in evaluating an individual's special abilities?
2. Compare the general intelligence test and the scholastic achievement test with respect to (*a*) predictive value, (*b*) effects of training upon results, and (*c*) constancy of scores upon repeated testing. For what school purposes might these types of test yield equally helpful information?

3. How do you account for the fact that general intelligence-test scores reveal slightly broader ranges of intelligence among boys than among girls?
4. Evaluate testing programs in (*a*) comparing schools and (*b*) counseling pupils in their choice of occupation or of school subjects.
5. To what extent may the types of learning encouraged by the school favor improvement or deterioration of an individual's I.Q.?
6. Compare the doctrine that "all men are created equal" with the common observation of individual differences, particularly in intellectual traits. Suggest how the two ideas may be reconciled.
7. Discuss the limitations of the general intelligence test in evaluating the intellectual efficiency of adults.
8. Summarize the conditions that appear essential if an individual's intelligence, as measured by tests, is to lie within the normal range.
9. Discuss the predictive value of the general intelligence test with respect to (*a*) scholastic success, (*b*) vocational fitness, and (*c*) educational limits.
10. Discuss various ways in which a teacher may take into account individual differences in mental ability in planning the procedures of classroom instruction.
11. Discuss the selective effect of schooling. Consider some of the cases you have observed of school failure based upon (*a*) intellectual limitations, (*b*) emotional stress, and (*c*) economic limitations.
12. Summarize adjustments attempted in school to meet (*a*) problems related to retardation and acceleration and (*b*) individual differences.

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CHAPTER III

Interests

Interests that children express in natural, unrestrained, voluntary activities constitute intimate revelations of individuality. They exemplify certain responses of children to reality, the nature of many types of ability which in the formal school program often find limited opportunity for expression, and various aspects of personality as manifested in social relationships. When a child goes to school, his thoughts may be colored by pleasant recollections of a story that he has read at home, by joy of success achieved in an experience with a hobby, or by the anticipated pleasure of playing in the afternoon. He is thus a living embodiment of vital, personal interests and purposes.

His interests are also indicative of his stage of development and the degree of self-identification with his surroundings. Their breadth and quality display his capacity for establishing pleasurable relationships with his environment, for utilizing its possibilities, and for deriving meaning from it. They may reveal his resourcefulness and initiative in satisfying his needs. They disclose the energy that he can expend toward the achievement of an aim.

Children release energy and enthusiasm more freely in activities which they like than in those which they dislike. Interests

which in themselves afford pleasure generally include also the pleasure of self-expression. Children may perform with efficiency many tasks to which they are indifferent or which they dislike. Unpleasant tasks are often performed with no greater satisfaction than that which stems from the hope of passing to pleasanter tasks. Activities associated with interests liberate energy more abundantly.

Recognition of pupil interests and their cultivation and enrichment is sought not only in order to make instruction a pleasant experience for the child and to assist him in realizing his total potentialities. It is sought also in order to utilize in accomplishment of classroom purposes the dynamic force that springs from closer identification of school aims with personal interests. Utilizing interests of children accepts the principle that drive should be associated with conscious purpose. Thus not only is total growth guided in desirable directions, but the energy of the growth process is fully utilized. In recognition of interests the classroom becomes for the child not a social device for frustrating his purposes but a means by which his opportunities to satisfy personal purposes are increased.

Unfolding of Interests

An individual's interests should be regarded in the same way as other aspects of his growth and development. Activities that he prefers, therefore, provide a basis for judging his maturity at a given time. If his interests diverge widely from those of typical children of similar age and ability, reasons for variation should be sought.

The emergence of interests is subject to the general laws of growth. As children pass from one age level to another, their spontaneous activities change from simple, active types to those which are increasingly complex. During adolescence, they become inspired predominantly by sex-social motives. The gradual unfolding of interests is characterized not only by increase in complexity and intensity of participation but by decrease in

variety of activities. Interests likewise become more personalized as upper age levels are reached.

Reading Interests

Types of material that children voluntarily read are of special interest to the school. From fanciful types of reading material characteristic of early childhood, children's interests gradually turn toward those involving fact and reality. When a child first learns to read, he keenly enjoys short, fantastic stories in which animals and fairies are dominating characters. He is also interested in stories about other children. He likes simple, rapidly narrated action with conversation. Informational material and humor usually have little appeal at this age.

Between the ages of 8 and 10, realistic stories about animals and adventure appeal to boys, and girls discover interest in stories of home and school life. Change from the fanciful to the realistic is usually completed between the ages of 10 and 12, when interest is awakened in stories of action, excitement, mystery, sportsmanship, bravery, and suspense. Comic strips are especially popular at this time.

Between the ages of 12 and 15, reading interests begin to center on practical aspects of the world. There is increase in amount of reading relating to history, biography, exploration, manual activities, and personal hobbies. The fiction desired must be exciting or mysterious. Girls choose books portraying love and romance. They read many books intended for boys, although boys seldom read girls' books. Children read in greatest quantity at the ages of 12 to 13 years, when more books are read in a year's time than many individuals read later during their entire lives. After the age of 16, boys and girls distribute their reading in about the same manner as adults; generalizations regarding preferences of late adolescence cannot be made.

Reading interest declines rapidly at the age of 15, when high-school studies and other types of activity compete for the student's time. The decline in quantity of reading with approach-

ing maturity suggests that increased appropriateness for mature social activities lessens the desire to enjoy vicarious experiences through reading. It is possible that interest in popular reading is discouraged by insistence upon reading of types specified by the curriculum.

Bright children read far more than average children, presumably because they readily understand reading material and are actually more efficient readers. Their reading material not only covers a wider range but includes material of higher quality. They are less attracted by fanciful material than that which requires thinking and meditation.

Gifted children seek reading material that challenges their understanding and approach it with unusual eagerness. They read for broad meanings instead of reacting impassively to facts, as may be the case among other children. Bright children enjoy reading that dwells on character development or the gradual unfolding of a dramatic background, presumably as a result of their superior ability to think abstractly. Such children frequently reach the height of the reading craze between the ages of 8 and 10 years, although they may continue to read widely of good material up to the age of 17 years.

Pupil differences, however, are great even among superior children. Many gifted children of a given age read relatively little. Others of the same age become extremely avid readers, devouring almost anything readable. Terman [1] found that some gifted children read as little as 3 hours per week; a few read as many as 30.

Children of the lower levels of intelligence tend to be satisfied with fanciful reading that furnishes entertainment, and are not interested in informational material or appreciative of all types of humor. Inferior ability to comprehend and meager factual background presumably favor fiction in preference to science, history, poetry, or drama. They are not attracted by reading

[1] TERMAN, L. M., and M. LIMA, *Children's Reading: A Guide for Parents and Teachers*, D. Appleton-Century Company, Inc., New York, 1927.

material that presents difficulty. Pupils of inferior intelligence prefer material that displays action, activity in sports, and familiar circumstances.

The quantity and quality of a child's reading have a highly significant bearing upon his intellectual development, since his contacts with learning material are made to a large extent through the medium of reading. Effective reading and mental ability are closely associated. Children below average in intelligence may undoubtedly be assisted through effort to improve their reading toward fuller realization of their potential ability. Spontaneous reading is likely to be at a low level of discrimination, since children do not ordinarily undertake reading that presents special difficulty. The problem of improvement, therefore, must be solved through training. Since the most important way of motivating a child's reading is to lead him into wanting to read, knowledge of the types of material that he normally selects may be a point of departure for broadening and elevating his reading tastes.

If the amount of reading that children do for pleasure may be increased, gradual improvement may be expected not only in reading skill but in their background of experience and knowledge, which may serve to extend and develop other interests. Of all types of interest, reading is one which can be most directly controlled and redirected by the school.

Discriminating reading habits and taste depend upon accessibility and abundance of desirable books and magazines, and upon standards set by teachers. Pupils become interested in good reading material if they can readily obtain good reading material and if their taste for it is cultivated.

Vocational and Academic Interests

Vocational interests undergo long periods of development before becoming relatively permanent. Our educational system encourages boys and girls to anticipate extended periods of training, during which aptitudes and interests have opportunity to

develop and to demonstrate permanence. Little influence is exerted to make early occupational choices, although certain high-school and college curricula require academic selections which direct occupational choices into broad fields of study. Undoubtedly, attitudes of distaste for the educational requirements of certain occupations exercise an influence which gradually increases with age. Dislikes of this nature narrow the selection of occupational preferences. Vocational interests appear to develop more fully in boys than in girls.

Occupational preferences of very young children are influenced but little by economic security. Pupils on the elementary-school level base occupational interests so largely upon superficial considerations that only a low degree of permanence may be expected. Occupations of greatest interest to young children are of an active or spectacular type. Boys wish to become firemen, policemen, athletes, soldiers, and sailors, since the activities implied have dramatic appeal. Girls are similarly attracted by the colorfulness and glamour suggested by actresses, opera singers, and dancers.

During high-school and college years, however, occupations acquire an increasingly personal meaning. Preferences for broad, well-defined fields are frequently permanent, although specific occupational choices within such fields are often changed. Some pupils during the first two years of high school show well-defined patterns of occupational interest. But as a rule occupational interests develop gradually from the first year of the high school through college.

High-school pupils are influenced in vocational selection by such considerations as income, interest, and personal ambitions. They generally select occupations with little regard for the mental ability required. Boys are attracted by science and invention; and their occupational preferences incline toward engineering, aviation, and science. "Probable" occupations indicated by high-school pupils on inventories designed to appraise vocational interests agree more closely with their average scholastic ratings

than with their "preferred" occupations. Association with an occupation, work experience, and fitness have little influence upon choices of either boys or girls.

Girls tend to project home influences into care of others as exemplified in teaching, social work, or nursing; and usually a disproportionately large number of high-school girls choose teaching and nursing. Social influences that affect girls are narrower in scope but more intense. To them traditional inconsistency of permanent occupational interests with marriage and home life is especially important. The conflict is frequently resolved by choice of occupations that provide opportunities for meeting members of the other sex.

Among high-school subjects, pupils on the lower levels of intelligence prefer shopwork; average or bright pupils select mathematics. In the modern school, in which all degrees of learning capacity are found, traditional school subjects are no longer within the ability of all pupils. Greater interest is displayed in abstract subjects by gifted children and less in practical subjects, a finding consistent with belief that current intelligence tests measure capacity for thinking abstractly.

Crabb found coefficients of correlation between scholastic attainment of Scottish children and teachers' rating of their interest to be +.95 and that between attainment and pupil self-rating to be +.40, a fact suggesting a tendency of teachers to estimate interest on the basis of attainment. Figure 15 [2] displays preferences for school subjects. Painting, drawing, and handwork have greater preference than history, poetry, composition, and grammar, although wider spread among such less preferred subjects is evident in each case in the length of line on either side of the dot. Pupils tend to prefer subjects involving activity and self-expression to abstract subjects, for which in unselected groups only a minority possess the necessary types of learning ability.

[2] CRABB, G. A., Study reported in W. McClelland, *Selection for Secondary Education*, p. 32, University of London Press, Ltd., London, 1942.

The occupational ambitions of gifted children tend to approximate the vocational activities of their fathers and display preference for public service, professions (in the case of boys), and artistic occupations. Unselected children tend to favor their fathers' occupations. Among their choices are found not only professions but occupations involving mechanical, athletic, and clerical activities, or those relating to transportation. Individuals

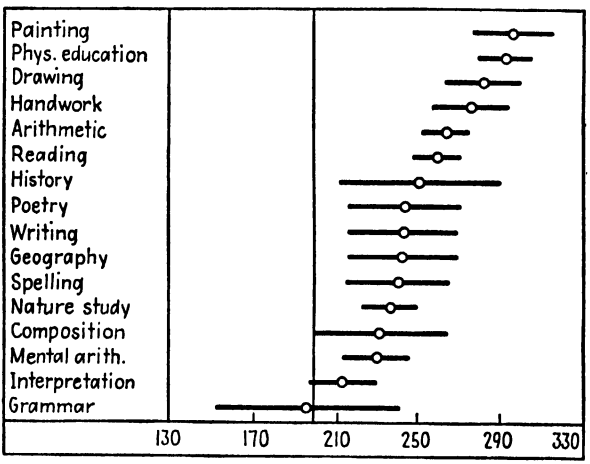


FIG. 15.—Pupils' preferences in school subjects.

who are unable to make occupational choices are frequently less studious, show greater physical development, and make lower scores on intelligence tests.

At college levels occupational choices indicate increased realism in evaluating certain factors that contribute to sound vocational selection. Social prestige of an occupation encourages boys to consider fields such as medicine, law, banking, or governmental service. College students select occupations for such reasons as (1) contribution to social prestige, (2) contribution to social well-being, and (3) probable economic return. As higher educational levels are reached, individuals consider occupational choices more realistically, although social prestige and economic gain sometimes outweigh personal interest and ability.

Although vocational ambitions frequently represent illusory aspirations that are never attained, the force of a child's interests in a vocation may be effectively utilized in making his school activities personally purposeful. Young children who are interested in becoming soldiers and sailors will be attracted by reading material describing life in the army or navy. Since older children become increasingly aware of the relationship between occupations and the ability and training required by them, the desirability of securing necessary preparation tends to become a highly personal aim. Aspects of certain types of subject matter may be associated with the requirements of various occupations. Subject matter should be arranged and presented so as to contribute to the awakening of new interests that have vocational reference. The applicability of subject matter to vocational fields should be indicated during the course of instruction.

Play Interests

Children discover in play a means of satisfying their natural desire for activity. Play becomes an important aid to their social development as soon as they begin to establish relationships with one another. Play activities also afford experiences that contribute to the development of such qualities as initiative, self-control, courage, cooperation, and appreciation of individual traits in others. Children's play interests are determined to a large extent by facilities available in their surroundings, the use they make of them, and the influence of the community and neighborhood culture. Childhood play is primarily physical activity. As types of play become more mature, they become more complex in organization and involve increasing intellectual expression. During higher age levels they become fewer in number, more individualized, and highly influenced by sex-social motives.

The child of 5 plays imaginatively with simple objects and at games requiring little organization. Such play is often solitary, even in the presence of other children. The young child imi-

tates many activities of adults. Games played with others are simple motor games such as tag and hide-and-seek.

At the age of 10, a boy's play interests require skill as well as increased physical exertion. He now engages in various activities such as football, baseball, playing catch, basketball, and riding a bicycle. His play at games is in accordance with loosely organized rules, although little teamwork appears before the age of 15 years. At about this age there is a trend toward competitive activities.

The play of girls is equally varied but tends to be of a less rough-and-tumble kind, presumably as a result of cultural restraint upon active sports and amusements. Up to a certain age, it is difficult to designate a given game or type of play as typical of either sex, although many toys are selected for children on the basis of sex appropriateness. Girls are more conservative in their play at all ages and display less variability than boys. During the first decade boys and girls play together freely, but as they near the prepubescent period they begin to prefer playmates of their own sex. Girls do not play at games requiring organized teamwork to as great an extent as boys.

During the prepubescent period, boys and girls draw widely apart in joint participation in play activities. With the approach of sexual maturity they again react favorably, but with new points of view, toward each other. With increase in age they tend to engage more frequently in the same activities. Preferred activities possess a sex-social character, patterned in such a way that boys and girls may jointly participate. Except for those boys whose active play interests are extended because of organized sports in high school and college, play interests tend to be of the inactive type. At athletic contests sex-social motives undoubtedly encourage a preponderance of spectators over active participants. Dancing and informal games at gatherings may be regarded as expressions of adolescent play interest.

With increasing age a tendency toward independence in play interests is noted. Play of young children in groups requires

organization and leadership. Their games interest them more when all engage in the same type of performance. Games of older children introduce general rules but leave the types of performance to individual initiative. In mature types of play fewer individuals participate jointly in a given activity. Figure 16 [3] traces the decline of group play of boys and girls. Group play

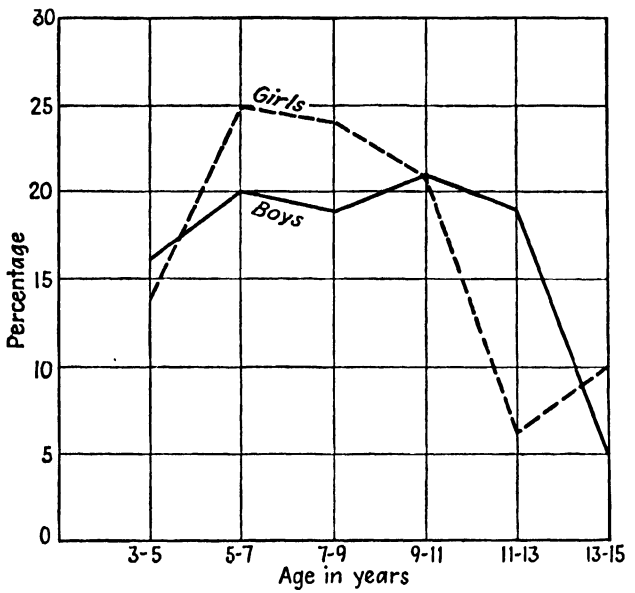


FIG. 16.—Percentage distribution of group play in relation to age and sex.

declines between the ages of 9 and 11 years. Participation of girls declines initially more rapidly than that of boys, but boys eventually display a greater degree of independence.

Although the bright child has fully as many play interests as the average or dull, his interests are more varied in character. He is likely to show less inclination toward such physical activi-

[3] HETZER, H., *Das volkstümliche Kinderspiel*, p. 80. (*Wien. Arb. zu päd. Psychol.*, No. 5), Deutscher Verlag f. Jugend u. Volk, Vienna, 1927. From C. Bühler, "The Social Behavior of the Child," Chap. II, p. 404, *Handbook of Child Psychology* (C. Murchison, Ed.), Clark University Press, Worcester, 1931.

ties as strenuous games, athletic stunts, and the rough-and-tumble types of play. With increase in age bright children tend to be slightly less social in their play and to prefer individualized games. At all age levels, they are more mature in their play interests than average children. They show preference for games that require thought as well as action and spend more time each day in mental recreation, such as chess or checkers, and playing musical instruments. Their extracurricular interests are likely to favor activity on publications, dramatic clubs, or athletic management. Average and dull pupils, who discover fewer interests in reading and mental types of recreation, are more likely to seek interests in vigorous sports.

Play interests during middle childhood are generally socialized in nature, but a minority of individuals in all age groups are inclined to concentrate upon activities that are highly individual. The extent to which children engage in similar activities is extremely variable. At a given age a small percentage of children are interested in activities at which few other children are engaged. An equally small percentage participate in the full range of activities of other children. The play activities that a given child selects are usually of common interest to about half of the other children in his general group.

The earlier change of play interests of girls to the sex-social type has educational significance. During the junior-high-school grades many girls are relatively mature as compared to boys of the same age. Many junior-high girls are no longer interested in active play while the boys who are their classmates may still show enthusiastic interest in games characteristic of middle childhood. Such divergence of interests tends to militate against group solidarity in a mixed classroom. In order to make satisfactory social adjustment, girls often select temporary companions among boys of higher school grades, whose social maturity is similar to their own.

Although play interests are not often likely to be combined directly with classroom activities except at the elementary-school

level, teachers should be primarily interested at all ages in their indirect effects upon achievement. Play interests contribute to a child's physical well-being, but more particularly they foster his emotional and social development. Ability to get along well with others in play activities implies that a child may be expected to adjust himself well in classroom situations. If play interests are satisfying, the emotional carry-over into school activities brings with it force and energy for satisfactory accomplishment. Children who are unhappy at play and who feel frustrated because of lack of ability, poor health, or failure on the playground, or who are anxious about nonacceptance by the group, often reflect their distressed feelings in lack of interest in scholastic achievement.

Other Interests

Personal hobbies become more complex and varied as children develop. Since many hobbies involve mechanical ability, they appeal more frequently to boys than to girls. Hobbies are often expressions of passing interests which are abandoned as new attractions appear. Others persist for many years, often lasting well into adulthood. Although they are to a large extent specific, hobbies are sometimes related to a general field of interest, such as electricity, in which they may persist from a juvenile interest in electric trains to the age of tinkering with radios. Analysis of the number and type of hobbies in which a child is engaged and the intensity of his interest in them is a valuable index of self-responsibility, since the child must often maintain such projects with his own resources and initiative. They may indicate the extent to which his scattered interests have developed into a homogeneous pattern. Most significantly, they generally accompany a high type of mental ability. Children without hobbies are more likely to be found in the low range of intelligence.

Hobbies are especially desirable aspects of a child's development, since they are generally constructive and involve intellectual activity. Since they often induce a child to seek information

among reading materials, his search for facts as he needs them, from the school's point of view, may be especially valuable. From such experience the pupil gains research training as well as new knowledge found in the facts acquired. He may gain information in science and mechanics that he would find meaningless in the abstract. Experimenting with a kite may introduce fundamental principles of aeronautics more effectively than a textbook. A boy who enjoys reconditioning an old automobile may learn more about the operation of a gasoline engine than a textbook on physics could demonstrate. Hobbies may reveal latent special aptitudes if they involve activity in a home workshop and contribute to manual dexterity. Interest in a hobby may create a driving force when the relatively abstract study of aspects of science and mechanics are studied at school.

Collecting various items is a common type of hobby. The varied kinds of item collected may include minerals, rocks, flowers, butterflies, insects, postage stamps, paper match covers, coins, and signatures of distinguished personages. Girls, more often than boys, collect personal items including articles associated with school experiences and friendships. Boys look to the outside world for items to collect, including trophies of strenuous outdoor life. Boys also collect many items of commercial value, buying and selling being common in stamp and coin collecting.

Collecting interests share the educational benefits to be derived from all hobbies. Especially, however, they necessitate fine discrimination of characteristics, such as color, size, shape, or geographical location, of the objects collected and also care in their classification. Boys tend to outnumber girls with respect to the number of collections made and greatly excel girls in the number of collections having scientific value. Bright children tend to collect more items and do so more efficiently than average children.

Trends of interest in radio programs range from low discrimination of elements of reality and the enjoyment of the fanciful to

fuller appreciation of real life situations. Because of diversity in types of program, it is not possible to generalize broadly.

During early ages, children enjoy dramatization of fairy tales and make-believe themes. Certain programs involving melodramatic adventure and juvenile characters are popular from the ages of 6 to 12 years. With advance in age, programs specifically designed for children are less favored, and choices are increasingly made among various types of adult entertainment. Interest in dance, popular, and novelty programs increases during the second decade. Children from 12 to 15 years prefer detective, mystery, and crime plays to comedy and variety programs. Drama of historical or romantic nature, classical or semiclassical music, and religious programs are seldom popular. Programs with educational content are consistently rated below most other types. Children younger than 15 years of age are more interested in excitement and humor than in music, which becomes more popular thereafter.

Children who have relatively high intelligence quotients spend less time listening to typical radio programs than less brilliant children. Exciting and adventuresome radio programs have less appeal for exceptionally bright children than for average children. Appreciation of humor seems positively related to the grade of intelligence. Dull children have greater dislike for comedy and variety programs than normal or bright children, but listen to dance music, popular songs, and narration of plays of emotional and sentimental appeal.

Sex differences in radio interest are negligible before the age of 15 years. Girls spend more time than boys listening to radio programs. Boys listen more to programs that are adventuresome, mysterious, and virile; girls enjoy emotional content, although no less sensitive to reality than boys. Girls between the ages of 15 and 18 listen to romantic and historical dramatization more than boys. At the same ages boys listen to a greater extent than girls to dance music and variety programs, but sentimental vocal music is more popular with girls. Although classical and semi-

classical music is seldom popular, girls appreciate this type of program earlier than boys. Humor content appeals slightly more strongly to boys than to girls.

Since almost every home possesses a radio, interest in some form of radio entertainment is almost universal among children, who typically spend more time listening to radio programs than attending movies. The appeal and influence of the radio are undoubtedly greater than of reading materials, but since neither radio nor movies possesses an effective counterpart among instructional materials, the school's power to direct tastes is limited. Knowledge of a child's tastes serves the purposes of the school primarily as a revelation of his present interests.

Movie interests follow general trends with age from fancy to fact and from realistic facts to complex themes associated with sex-social maturity. Young children are interested in movies involving rapid action and adventure, both of which are characteristic of "Western" plays. They like comedies of all types, despite their impracticality, and enjoy animated cartoons more than true-to-life drama. Girls are similarly interested, although their tastes also include light themes involving love and sentiment.

Children of higher grades of intelligence are generally able to discern unreal and fanciful aspects of a picture and to favor those which are relatively consistent with actual life. They are somewhat less interested in melodrama and slapstick comedy than in mature types of humor. Their wide reading often enables them to appreciate more fully the movie versions of books that they have read. Their superior breadth of information similarly derived makes historical or biographical pictures understandable.

Although the school has little opportunity to utilize current commercial movie productions in furthering its purposes, the expressed interests of pupils reveal many of their hopes and ambitions. As higher grades of pictures make their appearance, the teacher may cultivate mature tastes by recommending those which contribute to the content of school subjects as well as those which are especially informative or have unusual moral or cul-

tural value. Likewise, brief discussion of numerous pictures that pupils have seen may serve to emphasize their good and their bad points and thus encourage development of suitable standards for evaluating pictures. Since many children see at least one movie each week, the effect of the pictures they view introduces an influence that the school should take into account.

How Interests Are Shaped

Children are not born with propensities toward specific interests. They select their sources of satisfaction from available environmental opportunities, each child in accordance with his own uniquely individual manner of regarding his particular environment. The use that an individual makes of his environment depends upon his interpretation of it, which in turn reflects the nature and extent of his personal development. If we suggest therefore that given interests emerge as a result of environmental influences, we simply mean that the environment is a contributing source of such interests to the person whose individuality is appropriately attuned to that particular environment.

The most important single influence upon reading interest is that of the home. The reading interest of children who read with facility during their early years of schooling is often stimulated by having stories told and read to them and by having access to children's books at home. Such children usually learn to think of reading as a pleasurable activity and may become highly motivated for book learning and enjoyment. Older children are likely to be influenced in standards of tastes by the quality of material read and discussed by members of their families.

Homes of superior socioeconomic status are usually provided not only with a greater quantity of reading material but with that of a higher quality. Lazar's [4] investigation of reading habits of 2,027 elementary-school pupils revealed that bright pupils of

[4] Lazar, M., Reading interests, activities, and opportunities of bright, average, and dull children, Teachers College Contributions to Education, No. 707, Bureau of Publications, Columbia University, New York, 1937.

homes of inferior socioeconomic status read very extensively but that the quality of their reading material was inferior. Wolfson [5] found that boys in vocational schools do not read widely of nonfictional material relating to arts and crafts but are interested principally in fiction of questionable quality. Although the influence of socioeconomic status is suggested, it is evident that such boys are interested principally in the manual aspects of their schoolwork, which do not stimulate interest in intellectual activity required by reading.

If reading interests are inadequately stimulated by home environment, the importance of such interests for educational purposes necessitates full cooperation of the school. Independent reading by school children is sometimes discouraged because of the belief that such reading may conflict with formal school requirements. Actually a child's desire to read independently should be regarded as an ally of school instruction. Even though he may read much material that adults condemn as trash, it should be kept in mind that good reading tastes are products of growth. Elevation of such tastes should be secured through gradual substitution of superior material and utilization of manifested interest in reading. Use of the school and community library should be encouraged; and reading materials may be suggested that are related to a child's other interests, even if there is no ready association with school subject matter. Children are most likely to form well-developed reading interests when suitable material may be secured without too great effort. Active cooperation within the home can contribute richly to the growth of the child's personal reading interests.

The continuity of play interests from one generation to another seems to be assured as a reflection of customs and mores of society. Certain types of game such as hide-and-seek are traditional. Games at which children dance and sing stem from an-

[5] WOLFSON, H., A survey of reading interests in a vocational school for boys, *High Points*, 1939, 21: 60-63.

cient social rites and incantations. Young children learn them from older children, also from adults who regard certain types of play for children as their social inheritance. Sex differences in play often receive social encouragement. Girls are expected to be interested in dolls, and boys are provided with tools and mechanical devices.

The socioeconomic status of a family may affect the quantity and quality of a child's play. Woody [6] compared play activities of two groups of children, one at a laboratory school attended by children of superior home environment and the other at a public school attended by children whose homes represented low socioeconomic status. Children of the public-school group were found to have many after-school duties which conflicted with their play. When it was possible for them to engage in play, they resorted to conventional games in which their parents manifested little interest. The laboratory-school children had more abundant opportunity for play and also played, with the companionship of their parents, at many card and table games, being thus stimulated in play activities requiring intellectual activity.

The physical environment suggests many types of play activity. Proximity to lakes and rivers encourages swimming, boating, or fishing. Physical surroundings likewise limit types of play, skating and skiing being possible only in certain parts of the country. Differences in opportunity exist in country and city. Country children engage in fewer play activities than city children up to about the age of 10 years, because organization of group games is difficult where children of similar age groups are few in number and because playground equipment is more likely to be limited. Beyond the age of 10 years, country children engage in more play activities than city children, one reason being that in order to have companionship they must continue to associate with younger children. The play activities of country children are, in

[6] Woody, C., Similarities and differences in the play activities of children in two public schools with contrasting environment, *J. Exp. Educ.*, 1938, 7: 145-157.

general, relatively immature. The growth of large cities has limited the space necessary for many play activities, although this deficiency is met partly by school and public playgrounds.

It is apparent that, as increasingly greater emphasis is attached to the significance of play in a child's total development, many deficiencies in environmental opportunity must be overcome. Establishment of consolidated units in place of isolated one-room country schools results in assembling larger groups of children of similar ages. Supervision of group play under such conditions improves its effectiveness. Training and guidance are required if children are to benefit from existing facilities.

Failure to play is frequently not due to lack of opportunity but to ineffective socializing forces. Bringing children together, teaching all to play harmoniously, and assisting them to develop new opportunities for play will contribute to their total development and thus further school purposes. Various agencies in cities are making it possible for children to enjoy experiences in the country.

Movie interests are definitely influenced by the extent to which it is possible to attend movies. City children attend movies much more frequently than rural children because of differences in opportunity. Many rural children attend their first movie as late as at the age of 10 years, whereas many city children begin attending when very young. Commercial practices in distributing films limit movie offerings to those which are currently ordered by theater managers, and thus the influence of the school in improving movie interests must be in connection with those pictures which are being exhibited. Only under special conditions is it possible to anticipate the return of an especially desirable film.

Types of hobby in which a child may become interested are often influenced by the availability of material and equipment and sometimes by the popularity of a given hobby. Children become interested in making model airplanes when the necessary material may be purchased in local stores and when many chil-

dren are engaged in this hobby. Making collections may be practical only in localities in which suitable items are abundant, although some types of collecting, such as that of postage stamps, are not so restricted. Country schools have unusual opportunity to serve their children by providing them with information about minerals, flowers, and insects, which will aid them to identify collected items.

Vocational choices of children are positively correlated with the occupations of their parents, although usually to a low degree. Hyte [7] in an investigation of occupational choices of 1,248 Negro high-school pupils found that in general the occupations of the fathers were not chosen. Although 80 per cent of the fathers were engaged in skilled work, personal service, and unskilled work, only 16 per cent of the boys chose work in such fields.

Many vocational choices are inspired by opportunities for entering occupations in the immediate vicinity, but frequently occupations are chosen for which there is slight local demand. Kilzer,[8] investigating vocational choices of 2,274 high-school seniors in Wyoming, discovered that the number of individuals who selected professions was far out of proportion to the occupational opportunities of so strictly a rural state as Wyoming, of which the major industries are agriculture, forestry, and extraction of minerals. Nick [9] questioned 1,038 high-school junior and senior boys on vocational choices, requesting four choices to be given in order of preference. Job possibilities were then examined in terms of placements the preceding year by the State Employment Service and also of current unfilled vacancies. Following discussion of actual opportunities for employment at 63 occupations, the boys were requestioned and displayed greater real-

[7] HYTE, C., Occupational interests of Negro high school boys, *Sch. Rev.*, 1936, 44: 34-40.

[8] KILZER, L. R., Vocational choices of high school seniors, *Educ. Admin. and Supervision*, 1935, 21: 576-581.

[9] NICK, E. W., High school boys choose vocations, *Occupations*, 1942, 20: 264-269.

ism in their second selections. Hyte's [10] study revealed that 75 per cent of the Negro boys selected professions, a much higher percentage than could hope to attain their ambitions.

Nevertheless, patterns of vocational interest are based upon concepts of occupations in which persons are actually engaged. An adolescent rarely considers an occupation of his own creation, although specialized types of hobby occasionally become life work. Vocational choice is essentially selection among various possibilities in the environment. The novelty of occupations such as those which are developing from current investigations in fields of electronics and atomic energy are especially alluring to youth.

Environment is the source of stimulation that encourages emergence of special aptitudes and development of general ability. The richer a child's environment, the more likely he is to discover that his developing interests and abilities have vocational possibilities. Thus the school may provide stimulation not to be found elsewhere for important individual abilities and so utilize to the advantage of its varied purposes the force of each child's meaningful effort.

Emotional Content of Interests

The primary basis upon which children select interests is that of the emotional appeal that is felt. Their likes and dislikes are personal, and an interest must produce satisfactions and be consistent with their personal aims in order to be acceptable. If unpleasant mental effort makes pursuit of an intellectual interest dissatisfying, preference is likely to be given to substituted interests in which physical activity predominates.

Many interests are associated with wish fulfillment. Individuals constantly seek experiences that afford them success Their standards of success vary but are usually associated with desire for personal recognition or maintenance of self-esteem The experiences through which success is sought may be ob

[10] Hyte, *op. cit.*

tained through *active* interests, in which one is personally engaged in the pursuit of an interest. Playing tennis or building boats may be considered active interests. The experiences of others may be utilized vicariously, as in inactive or *passive* interests, from which the emotional effect may be felt through mental participation. Reading a book or watching a tennis match constitutes a passive interest. Interests may be variously motivated. Several motives may operate simultaneously; but although individuals may be aware of their preferences for certain activities, they are seldom conscious of the purposes that such activities serve.

A child is seeking satisfaction of a broad purpose in selecting one game rather than another because of particularly happy relationships with a certain group of playmates. His interest in the game may be both in the desire to excel in the skill involved and in enjoying the satisfaction of being socially acceptable. He may even participate solely because his refusal might be socially offensive. Certain individual interests may have mildly competitive aspects, as in postage-stamp collecting, at which the child hopes to acquire those items which are more valuable and rare than those of other children. One may become interested in taking long walks because of desire to be alone with his thoughts, the pleasantness of places he may visit, or the beneficial effects of fresh air and exercise. The individual may be unaware that he is relieving himself of many tensions and is making an emotional as well as physiological adjustment.

The exploratory or imitative character of many interests constitutes a form of adaptive activity. A little girl plays school in investigation of her ability at adult imitation. A boy may construct a miniature pulpit of scrap lumber and play minister as an experiment in realism. The amateur photographer adheres to prescribed techniques in order to obtain pleasurable success in results comparable with those of professional photographers. Imitation extends beyond blind acceptance of behavior patterns

of other persons into desire for satisfactions to be derived from success in duplicating their performance.

The extent to which one identifies himself with characters in movies or reading and obtains vicarious satisfactions depends largely upon the individual, whose responses may be subjective or highly objective. Some individuals are moved by scenes of suffering or sorrow to the extent of shedding tears. Others may regard the performance as oversentimental and ridiculous. Without leaving his easy chair one may, through reading, enjoy many of the experiences of traveling in foreign countries or being emotionally in *rapport* with the characters in a work of fiction. One may harmlessly experience the thrills of danger by identifying himself with a character in a movie or a story whose performance at daring deeds he might be reluctant to imitate in actual life.

People attend movies or read from very obscure motives, which are in most cases unknown to them. These interests may be sought simply to relieve boredom or to obtain the pleasure that is habitually obtained from witnessing favorite actors or reading works by certain authors and enjoying their characteristic styles. Painters, artists, writers, and musicians make their work capable of arousing in others the emotions that they themselves experience. The fact that individuals make different interpretations of identical situations accounts for the variable effects of a movie or a book.

Movies, in particular, become an interest of many people because of the completeness of detail with which they may enjoy a different type of life from that which they experience daily. As a rule, the environment depicted is on a higher plane from that of their own everyday experiences. The tendency of movies to glorify even the most lowly activities of life possesses democratic appeal. Scrubwomen, newsboys, and domestic servants are kindly treated, and their personalities are highly respected. Identification with hero or heroine may be close, and their roles may stimulate emotions attached to success. Individuals may readily discover means of escape from their own drab surroundings and

annoyances by imagining that they themselves are performing the activities that they are witnessing.

Individuals whose imaginations are keenly active and whose attachment to reality is unstable interpret movies with a high degree of subjectivity, as illustrated in the following typical responses [11] made by young people when questioned concerning their reactions toward movies:

A Boy Scout of thirteen, in writing of a "Western" play and its hero, said: "It put pep in me and made me be like him." Another scout "felt as if I was in the surroundings the picture was taken in and with the characters."

A seventeen-year-old delinquent boy: "Movies is the real stuff. You see things in the movies that are different—it's another life. Fine clothes, cars. Poor people want these things too and they ain't got them. Then it's over soon and you come out on the street and it's the same old thing for you, just like before you went in. . . ."

An eighteen-year-old delinquent girl told the following story: "I would see a movie where everyone was happy. I liked especially the dancing and the pretty clothes in the pictures. I wanted a gay life. The movies showed it, especially the movies with dancing in them. I just wanted things like other girls had, girls in the movies."

Mitchell [12] found that juvenile delinquents tend to have more frequent contacts with movies than other children, suggesting that movie interest apparently served to reveal the feeling of protest they held against the bareness, conflicts, and drabness of their own lives.

The general influence of the movies is a controversial issue, but most undesirable results ascribed to them are undoubtedly associated with extreme emotional susceptibility. Some children are stimulated by gangster pictures to engage in nefarious practices, but it is doubtful that movies alone arouse interest in crime

[11] MITCHELL, A. M., *Children and the Movies*, University of Chicago Press, Chicago, 1929.

[12] MITCHELL, *op. cit.*

unless the individuals are already receptive to such stimulation. Undesirable reaction to movie influence is most likely to be symptomatic of maladjustment which is caused by continued frustrating influences from other sources. Similar accusations are made of gangster or crime radio programs, lurid underworld stories, and even newspaper accounts of crime.

Although the emotional satisfactions derived from self-identification with characters in movie and reading situations who achieve success in attractively glamorous surroundings constitute artificial and inadequate adjustments, such behavior may not be regarded as unwholesome unless carried to an extreme. The daydreaming that a movie encourages is usually at an end with the conclusion of the showing. Many forms of entertainment overstimulate some children. In some cases their sleep is disturbed as a result of witnessing an unusually exciting movie. The problem, however, is an individual one. Children who prove oversusceptible to stimulation by any interest should be dealt with as individuals. Opportunity to escape reality may be found in nearly all activities, and the oversusceptible child undoubtedly requires personal guidance if his efforts to adjust to reality meet with difficulty.

Wish fulfillment may be observed in the extravagant nature of children's vocational choices, many of which are based upon considerations of social prestige and personal gain rather than upon ability and opportunity. Levels of aspiration at which individuals have little likelihood of attaining success gradually yield to those at which they may obtain larger measures of success.

A wide variety of well-selected interests is important to a child's emotional life as a means of utilizing the flow of energy that dissatisfying situations generate. In cases in which a child is frustrated by lack of success in the classroom or is distressed by certain conditions in his home, it is highly important that his pent-up emotions find opportunity for wholesome expression. A game of baseball after school or a hike into the woods with

companions affords opportunity to maintain emotional poise. The more active a child is in pursuit of a variety of constructive interests, the wider the range of possibilities for making adequate personal adjustments. If undesirable interests compete for his attention, they may be supplanted by emphasizing and encouraging the development of desirable ones.

Similarly, the enthusiasm and happiness that come with success in gratifying personal interests represent an important source of dynamic energy which may be utilized in effort toward high scholastic achievement. Recognition of the importance of children's interests and cultivation of those which show greatest promise has far more important aims than simply to keep children busy. The highest value of interests in a child's life is to increase the stimulating value of desirable elements in his experience to the extent that he will develop a well-poised state of emotional readiness to meet the demands of reality in all life situations. The child who is wholesomely interested in broadening his life experiences is seldom a school problem.

Evidence of Growth

Since cultivation and direction of children's interests are essential if they are to be fully utilized as driving forces in achievement, it is important that the teacher appraise from time to time, first, the manner in which interests are developing and, second, the extent to which effort to foster them has been successful.

Since the first aspect of such appraisal is to survey the status of a child's interests, a definite procedure should be established by which information may be obtained concerning not only his favorite types of activity but the specific ways in which such activities are expressed. The teacher may find convenient the use of an informal questionnaire, which makes specific inquiries relating to the various types of activity likely to be discovered. In the case of reading interests, for example, information is desirable concerning favorite types of reading material, amount of time spent in reading, books and magazines recently read, and

topics in reading material that are most attractive. Many children have difficulty in recalling titles and authors, and more exact information may be secured by having them keep a reading diary for the recording of all voluntary reading.

Details concerning hobbies may be obtained by giving pupils opportunity to describe them orally or in written compositions, or in some cases to demonstrate their hobbies to the class. They may welcome opportunity to display samples of their collected items. Asking pupils about their favorite interests is a means of securing further details and also presents an opportunity to initiate a spirit of cooperation with their interests.

For convenience in reviewing periodically the extent to which children are manifesting improvement and development, the significant facts concerning each child's interests may be recorded on cards. Additional entries may be made from time to time as new facts are discovered. If the teacher is thus able to refer to a summary of a child's interests and avoid the necessity of trying to remember the large number of individual facts that are certain to accumulate, the child is impressed by the teacher's interest in him. The attitude that the teacher is a coworker may be thus subtly cultivated.

The second aspect of appraisal, after sufficient information is available concerning a child's personal interests, is to study them with reference to other facts relating to his development. Good judgment in appraising a child's interests is more important than the application of arbitrary standards. Our principal concern is whether such interests are in harmony with reasonable expectations of a child at a given stage of development. Reference to the following suggested criteria may disclose opportunity for influencing a child's interests in a more desirable direction.

Stability

During the early years it is expected that interests will shift markedly as the individual passes from one stage of maturity to

another. So long as he is learning and is changing, interests will reflect such vacillation. With advancing age, however, interests may be expected to become increasingly stable.

Harmony with Personality

Interests should coincide with and supplement other measures of the individual's personality. If they display little relationship with ability or if various hobbies are in conflict, superficiality may exist. It is desirable to determine whether a given interest is genuine or whether it has been created upon an unsound basis. Through the influence of a teacher, children are sometimes led to believe that they are profoundly interested in a given subject-matter field and may, for example, think of mathematics as a field for life endeavor. It may be discovered that the attraction of mathematics, without the personal influence of others, is relatively low. Parents sometimes attempt to influence a child's choice of a vocation in which no particular aptitude or genuine interest exists.

Expansion and Concentration

Interests should expand in certain directions if an individual's personality is to be effective in various phases of total development. This expansion is particularly desirable as the adolescent begins the role of an adult and faces increasingly complex types of social responsibility. During expansion of interests, however, especially those related to vocational and educational objectives, the individual is concentrating upon definite goals. He needs to abandon interests that conflict or are inconsistent.

Effect of Instruction

It should be possible to detect evidence that instruction is elevating levels of taste and discrimination. Children should read increasingly better books, display fuller appreciation for good music, and reveal in various interests that the school has made a contribution. The school should awaken in children a desire

to take the initiative in developing interests and make certain that their efforts are meeting with encouragement and approval. The school plays a dominant role in determining the types and range of interests, and provides continued stimulation for their development.

Self-exploration and Self-realization

Increased maturity should give children greater insight into their potentialities and enable them to analyze for themselves their capacity for development in certain interests. Awareness that their interests are parts of themselves and are ultimately matters for which they must assume responsibility should gradually crystallize into a self-reliant attitude. A growing urge to explore both the richness of one's own personality and that of the environment which surrounds and influences it should be a leading outcome of all guidance and teaching.

PROBLEMS FOR DISCUSSION

1. Outline typical activities classified as *play,* describing (*a*) changes with age, (*b*) sex differences, and (*c*) influence of environment.
2. Discuss the extent to which children (*a*) are individualists in play activities or play in groups and (*b*) share the play interests of one another.
3. Summarize the (*a*) emotional, (*b*) social, and (*c*) intellectual effects resulting from the stimulation and broadening of a child's interests, upon his scholastic progress.
4. Suggest apparent relationships of range, quality, and maturity of a child's interests with his level of intelligence.
5. Suggest a practicable method of utilizing interests in educational and vocational diagnosis.
6. To what extent is it possible to predict interest upon the basis of aptitude? Aptitude upon the basis of interest?

7. Discuss the hazards incurred in attempting to provide opportunities for highly specialized vocational training in advance of the college level, at least, for reasons associated with (*a*) stability of interests, (*b*) occupational opportunities, and (*c*) adequate appraisal of aptitude.
8. From an appraisal of a child's reading interests, what other conclusions concerning him are often valid?
9. Examine voracious reading or intense interest in movies or radio as possible psychological mechanisms whereby the individual seeks (*a*) escape from reality and/or (*b*) enjoyment of vicarious experiences. Why might lack of guidance in such interests be more disastrous during childhood or youth than during adulthood?
10. From the standpoint of social demands and the individual's ultimate welfare, formulate your point of view concerning the extent to which the child's interest in school activities should determine their nature. How would you approach the problems involved in teaching a school subject in which some pupils might profess complete lack of interest?
11. In what ways may a teacher be unwise in emphasizing among pupils certain of his own interests? Formulate criteria for evaluating the appropriateness of a given interest for a child.
12. Outline a basis upon which the development of a pupil's interests may be defended as an important educational outcome throughout all educational levels.

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CHAPTER IV

Attitudes

An attitude is a tendency toward uniformity of emotional response with respect to persons, objects, institutions, beliefs, or personal behavior; and expresses different degrees of acceptance or rejection. If one's feelings are for or against something his attitude possesses both direction and force. A child reflects an attitude in asserting that being honest in taking a test is important. He may support honesty in taking tests by refusing to accept opportunity to cheat. He may accept the principle simply as a moral precept which he has heard many times and yet occasionally cheat if he believes he may avoid detection.

The purposes of the school are significantly associated with children's attitudes. Classroom instruction varies in effectiveness according to the attitudes which children bring to school and those which such instruction creates in them. The value of subject matter may be considerably lessened, for example, if prejudice against science is inculcated in the child by home influences. Relationships with his teacher may be unsatisfactory if he manifests hostility as a result of conflicts with former teachers. Racial or religious bias may prevent his full cooperation with certain members of the class. He may possess implicit belief in all statements in textbooks, or he may be hypercritical

of the truth of any statement read. He may have antisocial attitudes and accept cheating, "bluffing," and dishonesty as legitimate means of obtaining good school grades.

During their school years children develop attitudes that may adversely affect personal relationships with others during later years and may fail to develop those attitudes which will contribute to their personal happiness. They may acquire an attitude of superior knowledge and argue without defining issues and with little respect for facts. They may become susceptible to the insidious effects of gossip, particularly in its usual derogatory form. They may accept uncritically beliefs in astrology or patent medicines, or be unable to recognize propaganda.

The teacher through his opportunity to direct instruction may cultivate attitudes that will free children's thinking from ignorance and prejudice. Although he may not without restraint dictate to them what they are to think, he may endeavor to aid them to learn how to think. He may teach them how to evaluate opinions critically and guide them in forming attitudes that encourage comprehensive treatment of reality.

How Attitudes Are Formed

One may have attitudes toward almost anything or anybody, although most attitudes are of low intensity until, through localization and discussion, they acquire strong positive or negative qualities. One may have fixed beliefs concerning the merits of an article of merchandise or toward the act of a friend. In this sense, attitudes may be considered specific. On the other hand, one may incorporate a broad personal ambition into a philosophy of life and maintain a consistent attitude toward the desirability of his purpose. Individuals may be conservative or liberal, and such a general attitude may surround many specific attitudes. One may be tolerant of gambling, believing that individuals should be allowed liberal bounds of personal freedom. Inconsistency between attitudes and behavior appears to occur more widely in general attitudes than in specific ones to the extent

even of suggesting that the concept of a general attitude lacks validity.

Since attitudes are associated with emotions, they are generally unconsciously formed. Unlike interests, which seek immediate expression, attitudes may remain latent for long periods of time until opportunity for expression appears. Initially emotional products, they may be unexpressed in words until definite statements of opinion are demanded. Attitudes when so expressed may even then inadequately reflect true feelings. When an individual is asked for an opinion, his attitude is often revealed to himself for the first time. Intellectual processes may later be applied critically to an attitude, and it may become a reasoned conclusion. On the other hand, attitudes may be so highly emotionalized that one will reason illogically in order to preserve them.

Attitudes constitute the emotional residue of personal experiences and various items of information. If the reaction produces satisfaction or dissatisfaction, emotional learning occurs. Daily experiences provide the background for many of an individual's varied attitudes. Children, who in their English classes have read one book after another without developing interest or understanding, often generalize the effects of frustrated effort into an attitude that study of English literature is uninspiring. An unfavorable attitude already formed toward the school sometimes yields attitudes of narrower scope, such as the point of view that cheating in the classroom is justifiable. A single experience, if highly emotional, may have sufficient force to create an attitude. As a result of a single thoughtful act, a teacher may induce in a pupil a cooperative attitude; unjust punishment may result in a resentful one.

A particularly fertile source of attitudes is their acceptance *in toto* from other persons. Children overhear opinions expressed by parents and uncritically accept them as their own. Thus, white children who have few contacts with different races form racial attitudes on the basis of comments made by parents. Simi-

larly they form unfavorable attitudes toward others on the basis of gossip. Readers of editorials in newspapers frequently appropriate the attitudes that the writers express toward matters of public concern. Attitudes frequently display the prevailing opinions of social groups of which individuals are members. The influence of the church, the home, the school, the Boy Scout troop, and the street gang all leave different effects. The radio, movies, books, magazines, and newspapers display experiences to which individuals react emotionally. Their feelings tend to generalize and color future reactions toward similar experiences.

The unconscious process through which attitudes are formed is a partial explanation of the frequent lack of logical foundation for an individual's attitudes. Since he is unaware that he is developing a point of view, he is unlikely to initiate effort toward its evaluation on the basis of adequate facts and logical reasoning. Not until an individual becomes aware that he possesses a definite attitude is there any likelihood that he may examine its logical basis. He may not know why he thinks as he does, for the experience that inspired his attitude long since may have been forgotten. Nor will he change his opinions and beliefs unless he has new experiences. Thus many individuals possess definitely unfavorable views toward socialism, but, when pressed for reasons to account for their attitudes, prove unacquainted with even its basic principles. The symbol of a system of beliefs, as in the case of socialism, is often accepted or rejected on the basis of popular opinion.

Problem of Measurement

Effort to measure attitudes has been concerned largely with determining the intensity and direction of given attitudes. The usual inquiry is whether, for example, one believes one should tell the truth and how strongly one so believes or disbelieves. Responses may range from the positive extreme of believing that truthfulness should dominate all other considerations, to the nega-

tive extreme of regarding it as an impracticable virtue of dubious merit. It is obviously impossible to determine what attitudes an individual possesses. Consequently, certain attitude-objects are chosen concerning which he may have a definite point of view. The nature of his opinions is determined by appropriate measuring devices.

Measurement of attitudes is frequently an inadequate means of determining whether an individual will express in his actual behavior the beliefs that he professes. In many cases, he may be aware that certain responses are more acceptable than others and be uncooperative with any effort to determine the nature of his actual beliefs. During war conditions, individuals become conscious of the undesirability of revealing certain of their unpopular convictions regardless of their sincerity. Frequently, special techniques are necessary in order to penetrate an individual's defenses against display of his true feelings.

A common technique of measuring attitudes is that of presenting an opinion scale consisting of a series of statements spaced at equal intervals between extremes of favor and disfavor. The statements are placed in their respective positions according to their valuation by several judges as to their appropriate rank order and are assigned numerical values according to the degree of acceptance or rejection that they imply. The individual whose attitude is being measured is asked to select those statements which most closely coincide with his beliefs. In order, for example, to determine an individual's attitude toward the Germans, statements [1] may be presented such as:

( ) 1. The Germans as a race are a very pleasant people.
( ) 2. I'm prejudiced against people of German descent.
( ) 3. German people are no better and no worse than any other people.
( ) 4. I admire the German people unreservedly.

[1] PETERSON, R. C., *Developing Attitudes in Children*, University of Chicago Press, Chicago, 1933.

The individual's score is the median of the values assigned to the statements that he selects.

Such a technique is well adapted to measurement of attitudes that have become stereotyped. Thus a scale of this type reveals the extent to which the term "Germans" and its acquired connotations elicit favorable or unfavorable reactions. But its results may inadequately determine the extent to which the attitude would influence specific behavior or affect opinion on specific attributes of Germans.

The disadvantages accruing from the use of the name of the attitude-object is believed by Stagner [2] to be lessened by restricting statements to those referring to specific practices which the possessor of an attitude may approve or disapprove. Thus one's attitude toward fascism may be more adequately evaluated if the term "fascism" is omitted and the statements are related to policies and principles characteristic of fascism in practice.

A variant of this technique involves preparation of statements dealing with concrete situations. The intensity of attitude toward honesty, for example, may be revealed by determining the manner in which an individual states that he would act in real situations. Such situations may be so described that he is unaware that the quality of honesty is under investigation. The relationship between responses and the actual attitude-object must obviously be inferred.

Many techniques present items in the form of paired comparisons instead of a rank-order scale. The following example [3] illustrates the method of paired comparisons in determining attitudes toward nationalities:

This is a study of attitudes toward nationalities. You are asked to underline the one nationality of each pair that you would rather associate with. For example, the first pair is

[2] STAGNER, R., Fascist attitudes: their determining conditions, *J. Soc. Psychol.*, 1936, 7: 438-454.

[3] PETERSON, *op. cit.*

Englishman-Norwegian

If, in general, you prefer to associate with Englishmen rather than with Norwegians, underline Englishman. If you prefer, in general, to associate with Norwegians, underline Norwegian. If you find it difficult to decide for any pair, be sure to underline one of them anyway. If two nationalities are about equally well liked, they will have about the same number of underlinings in all of the papers. Be sure to underline one of each pair, even if you have to guess.

Englishman-Norwegian	Norwegian-Irishman	Greek-Pole
Swede-Belgian	Swede-Russian	German-Austrian

Lists of words are also sometimes used, and the individual is asked to check according to the pleasant or unpleasant connotation of each word to him. Such a method is essentially that of free association, its success depending upon the intensity of the attitude under consideration and the individual's cooperation in registering his immediate reaction without hesitation.

The techniques thus far described have been applied most frequently in research investigations that have sought to obtain information concerning the effects of various influences upon attitudes. The teacher may, however, wish to appraise the effect of instruction in a relatively informal manner without expenditure of excessive time and energy, which use of formal scales often requires.

One convenient method of measurement consists of the use of a standardized scale. Remmers [4] has simplified the procedure for measurement of attitudes through the construction of a series of "master scales," which may be readily adapted to the determination of an individual's point of view toward any one of a *class* of attitude-objects. In using such a scale, it is necessary simply to indicate the topic to be considered. Although the state-

[4] REMMERS, H. H., Generalized attitude-scales—studies in social-psychological measurements. Studies in attitudes—a contribution to social-psychological research methods, Studies in Higher Education XXVI, *Bull. Purdue Univ.*, 1934, 35: 7-17.

ments that appear upon the various types of scale do not refer specifically to an attitude-object selected, they are meaningfully related to *any* attitude-object that is typical of the class of attitudes.

Figure 17 shows a portion of a Remmers-type scale which may be used to measure attitudes toward types of social institution such as the church, the school, the United Nations, etc. The use of such generalized scales eliminates the necessity of formulating specific statements for the purpose of reflecting varying degrees of favor or disfavor related to an attitude. Such scales are available [5] for various classes of attitude-object including *any* teacher, homemaking activity, play, practice, proposed social action, racial or national group, school subject, social institution, or vocation.

Corey [6] suggests an informal method of constructing an attitude-scale which is not only simple and effective but in the course of its preparation encourages pupils to reflect upon various aspects of an attitude in advance of expressing points of view. Such a procedure lends desirable emphasis to specific training of attitudes. The four steps briefly outlined are presented with reference to "honesty on examinations" but are generally applicable to measurement of other attitudes that may be selected.

Step 1. Each pupil is asked to prepare several short statements expressing opinions concerning honesty on examinations. Some statements may read: "Cheating is as bad as stealing" or "A little cheating on daily tests doesn't count." Pupils may be allowed to ask parents or acquaintances for additional statements. If desired, such canvassing for statements may be accompanied by appropriate discussion of the attitude, although such discussion will presumably be to hear opinions rather than to impose points of view.

[5] Division of Educational Reference, Purdue University, Lafayette, Ind.

[6] COREY, S. M., Measuring attitudes in the classroom, *Elem. Sch. J.*, 1943, 43: 457-461.

Step 2. The teacher will edit the statements submitted to eliminate duplication. Certain criteria will be applied to the final selection of items: (*a*) Statements must be debatable opin-

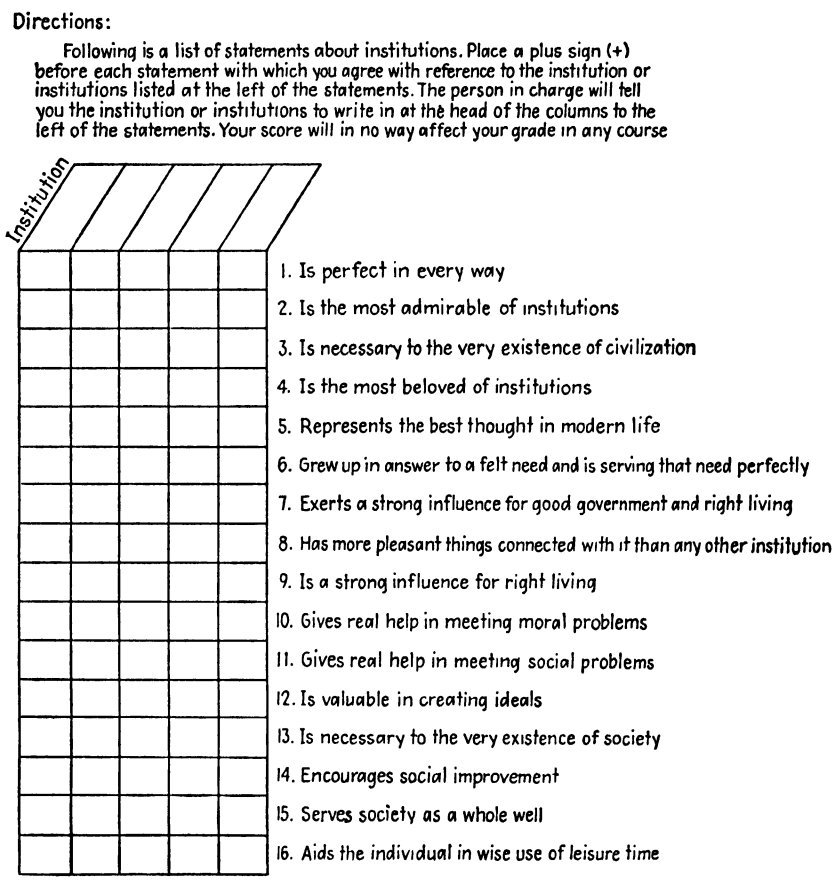


FIG. 17.—Sample items of a Remmers-type scale.

ions; (*b*) they should be capable of only one interpretation—be unambiguous and not "double-barreled"; short statements are preferred; and (*c*) technical statements should be avoided.

Copies of the statements are prepared in sufficient quantities to provide each pupil with a copy. Each pupil is asked to mark plus (+) each statement which he considers a satisfactory ex-

pression of favorable opinion and to mark minus (−) each statement which is an unfavorable opinion. He is *not* at this time indicating his own opinions but merely assisting in selection of items. Statements concerning which 80 per cent of the class agree may be considered intelligible expressions of opinion. To save time, this part of the procedure may be carried out by calling for a showing of hands on each proposed statement.

Step 3. The appropriate statements are listed for use as a test. An adequate number is fifty statements. When the test is administered, desirably after the lapse of a short interval of time, pupils are instructed to mark statements plus (+) or minus (−) according to their personal point of view. If they are in doubt, they may mark with a question mark (?). *In addition,* all statements which they *particularly* favor or disfavor may be so indicated by circling the plus or minus. They may be allowed to take the test without revealing their names, or they may be asked to express opinions which they believe are held throughout the class.

Step 4. The first part of the scoring consists of separating the items according to the decisions made in Step 2. The favorable group of items will then be scored:

5 for plus (+) circled
4 for plus (+)
3 for question mark (?)
2 for minus (−)
1 for minus (−) circled

The unfavorable group of statements will be scored in the same manner, and the scores of both groups are then combined. A score of 250 represents a maximum degree of favor in the case of fifty (50) items. Indifference is revealed by a score of approximately 150, and a score of 50 indicates an extremely antagonistic point of view.

Effects of Training

Although attitudes are usually formed gradually and tend to persist as long as they satisfy the individual, their intensity and direction may be modified if suitable influences are brought to bear upon them. Many experimental studies of the permanence of attitudes have utilized standardized tests to measure attitudes before and after the showing of motion-picture films or the introduction of other influences relating to the attitude-object. White children who were shown the film *The Birth of a Nation*, which is considered strongly biased against the Negro, became definitely less favorable toward the Negro. Similar shifts of attitude have followed lectures that have been intentionally biased in order to determine whether a desired effect upon an attitude might result. Unless the influence is continued, however, many attitudes tend in time to regress toward their initial status.

The belief is commonplace that children should be taught *how* to think but not *what* to think. Unfortunately this belief involves a misconception of the learning process. Learning cannot take place in an intellectual vacuum or in the absence of facts drawn from daily experiences. Emotional responses are inevitable consequences of contacts with reality. In fact, effort is made to provide facts that are personally meaningful to the learner in order that he may identify learning material more effectively with his own purposes and interests. Experiences in the classroom as well as in the home and the community are productive of attitudes, many of which are unconsciously formed. During the process of learning, it is inevitable that points of view will be acquired.

Our culture is opposed to indoctrination of beliefs that threaten the integrity and security of the social order. For example, principles underlying the organization of totalitarian states governed by dictatorial groups conflict with American traditions of democracy. Conflict with the American tradition of religious freedom would result if children were taught by the school that the only

valid religious beliefs were those of a given church denomination. Indoctrination, therefore, is limited by certain broad, widely accepted attitudes relating to the status of our present social order.

Indoctrination, however, has been practiced at all times in order to cultivate certain broad attitudes. History books leave an indelible impression that the Revolutionary War sought to eliminate foreign oppression. Patriots and statesmen are praised, and our political and social institutions are glorified. Indoctrination is practiced as social mores are transmitted from one generation to another. A degree of conformity to social tradition is exacted of growing children, and freedom to form such attitudes upon the basis of free will is restricted. Manifold influences attempt to impress specific attitudes upon individuals of all ages. For example, it is necessary only to observe the advertising effort made by the press, radio, billboards, and window displays. Editorials and articles in newspapers and magazines, articles by professional columnists, lectures, sermons, political addresses—all are attempts to cause people to adopt points of view.

The extent to which conclusions should be presented to pupils without immediate verification depends not only upon the nature of the situation upon which attitudes may be expressed but also upon the maturity of the child. Obviously, young children and those of lower levels of ability are less capable than older and brighter children of intellectualizing their attitudes. Growth in such capacity appears to be related to growth in ability to generalize. Attitudes of immature children are likely to be based upon fewer experiences.

The term *indoctrination* includes the implication that attitudes are cultivated by the method of implanting them as accepted conclusions. In the case of many attitudes related to the established social order, such indoctrination without extensive debate concerning their validity is without doubt desirable. Attitudes in favor of democratic principles or against various forms of crime scarcely require defense.

Classroom instruction, however, invites discussion of attitudes on controversial issues. Such issues commonly receive varied treatment in the hands of different teachers. Some teachers are willing to express points of view even though their attitudes are biased and frequently do so with little examination of the facts. Other teachers hesitate to approach controversial issues, being apprehensive of their familiarity with all aspects of such issues and aware of the difficulty of being emotionally impartial. Many teachers are reluctant to permit their prestige as teachers to weigh unduly upon any aspect of a controversial issue. Dogmatic statements of attitudes are without doubt the least desirable means of dealing with controversial issues, since they contribute little to training in orderly thinking.

On the other hand, evasion of controversial issues may deprive classroom instruction of vital contacts with daily experience and make it sterile and uninspiring. Pupils often already possess attitudes upon important questions of the day, basing them upon opinions of other people, personal prejudice, and inadequate information. Since such attitudes may arise from chance influences, the interests of pupils are often best served if facts relating to given issues are obtained and frankly discussed. Instead of ignoring reality, it is preferable to approach controversial issues from a fact-finding point of view. The situation may be regarded as a source of valuble training in open-mindedness, suspended judgment, and evaluation of evidence. If such treatment of reality is managed with tact and good judgment and if the situation does not lead to imposition of ready-made opinions, indoctrination of attitudes toward orderly procedures of investigation is desirable.

Training and instruction will affect many attitudes that children possess, although the influence of the school will be felt in some cases more strongly than in others. Various factors operate in determining whether a point of view may be easily changed or whether it is firmly rooted.

1. Attitudes that most strongly affect self-interest and pur-

pose are less readily changed than those in which the individual is not vitally concerned.

2. Loyalties to various groups such as family, church, or companions make attitudes tenacious. Individuals often have private opinions that are different from those which group membership demands.

3. The difficulty in changing an attitude is related to its intensity.

4. The more highly emotionalized an attitude, the greater the difficulty in changing it. Individuals whose attitudes are based upon highly emotional interpretations are less subject to change than those who have intellectualized their attitudes by studying the evidence.

5. If an attitude is shared by a large number of people, it is likely to persist. An attitude which is highly individual and which is in conflict with prevailing attitudes is more easily modified.

6. The stability of an attitude depends upon the balance between influences seeking to change it and those which have created it or continue to reinforce it.

The Teacher's Opportunity

Opportunities for dealing directly with attitudes are limited by several major obstacles. One serious obstacle is the relatively slow development of attitudes, for, unlike facts and skills, which may be acquired readily with a high degree of objectivity, they tend to await emotional changes within the individual. To condemn an attitude of an individual as unwarranted by facts often increases his resistance to change, because of other attitudes affecting his personal dignity. A second obstacle is the obvious difficulty of dealing individually with the infinite number and variety of attitudes that an individual possesses. Finally, the methods that may be effectively used under ordinary classroom conditions are largely those of making subtle indirect influences felt as situations or discussions arise in the classroom.

Instructional activity, however, may be used in cultivating intellectual habits for evaluating the products of thinking, in subjecting emotionalized attitudes to reasoned analysis, and in applying proved facts to beliefs. Direct attack upon attitudes is rarely advantageous. Influences that are emotionally satisfying must be felt. New facts may ultimately change attitudes. But in order to be fully effective, such facts must be capable of producing a desired emotional effect and must have both time and opportunity to do so.

The school recognizes as one of its important objectives the cultivation of desirable social attitudes, which include responsibility for law and order and the acceptance of principles of democracy, honesty, and decency. Cultivation of high social principles by precept is less effective than example and practice. The school organization provides many opportunities for forming social attitudes. Children must establish harmonious relationships with one another individually and in groups. They may be led to discover that certain methods of dealing with one another produce good results whereas other methods produce undesired reactions. Democracy may be learned by making it the basis of classroom procedures. The class group should be regarded as a social unit, in which each individual is entitled to certain rights and privileges and in which he must also assume certain obligations. Situations in which pupils themselves participate and thus are directly affected create a realism that would be difficult to secure through discussion of abstract principles of democracy.

Sound states of mental health are induced by pupils' attitudes toward themselves and their own efforts. A child's feeling, for example, that the teacher dislikes him is essentially an attitude. Its persistence may interfere with his scholastic success, through fear that the teacher will deny him recognition for good work. Other pupils may possess the attitude that if the quality of their work pleases the teacher to the extent of meriting a mediocre passing mark, their scholastic responsibility is satisfied. Atti-

tudes of this type are products of classroom procedures. Unless care is used, a teacher may intensify undesirable attitudes instead of eradicating them. If pupils are encouraged to study to please the teacher, their attitudes toward scholastic activity may be those of satisfying minimum requirements. If they are attracted by discovery of personal interest in subject matter, they are likely to exceed minimum requirements in striving for maximum satisfaction from their effort.

Children as well as adults acquire numerous attitudes based upon error and misconception, which may obviously be dealt with only when pupils spontaneously reveal them. The following are examples of popular ignorance: medical quackery (diet fads, herb medicine, patent medicine, self-doctoring), superstitions, spiritualism, and religious intolerance. Beliefs and opinions based upon dubious attitudes are illustrated by the following statements:

1. Cherries eaten with milk are poisonous.
2. Why vote? One vote more or less doesn't matter.
3. My teacher said so.
4. You can't tell me, *I* know.
5. All politicians are corrupt.
6. Capitalists brought on the war.
7. The war happened because the Bible predicted it.
8. Only hypocrites attend church.
9. Mrs. Smith told me that Mrs. Jones said she heard . . .

The use of proverbs and sayings illustrates a pattern of rationalization which is frequent. Individuals who postpone decisions philosophize with "All things come to those who wait." On the other hand, those who continually hurry to complete their activities maintain that "Procrastination is the thief of time." "Honesty is the best policy" is acceptable to some people, whereas others advise "Do others before they do you." In the case of a large majority of proverbs, others may be discovered that present conflicting advice. Inconsistency and contradiction are character-

istic of half truths. Idle argument is frequently characterized by absence of clearly defined issues. Many individuals argue irrationally, using such devices as loud talking, needless repetition, and attacks upon personal character.

Persistence of error in attitudes and beliefs may have origins other than lack of enlightenment with respect to demonstrable truth. Many erroneous beliefs persist because of their emotional satisfyingness. The faith of some individuals in astrology is relatively weak. But satisfaction results from feeling that possible opportunities for success have not been overlooked.

The most effective way of dealing with misconception is the creation of attitudes that will serve as checks on accepting half truths and falsehoods. Superstitious beliefs tend to diminish with age as well as with increased educational attainment. Men are less superstitious than women, perhaps as a result of a stronger tendency to apply to a belief a criterion of acceptance such as that of scientific inquiry. Emotion is positively correlated with superstitions, whereas knowledge is negatively correlated. In other words, such a superstition as belief in disaster as a result of walking under a ladder may persist if fear is great, but may fade if people are observed walking under ladders unharmed.

Related to superstitions is belief in spiritualism, fortunetelling, and similar mystical pseudo sciences. The obvious fallacy relating to such beliefs is the assumption that, since science is sometimes baffled, the only explanation must be that occult powers are possessed by some individuals and not by others.

Although many attitudes are relatively transitory and innocuous, for example, a child's faith in Santa Claus, children should be encouraged to be critical of statements heard and read at the earliest age possible. A larger number of adult attitudes than is commonly supposed are formed during the early years of a child's life, since under usual conditions he is then relatively suggestible. The formation of an attitude favoring search for reliable information may be encouraged by training.

During early stages of training, the procedure may include

careful examination of appropriate statements, which may be selected during classroom discussion. A pupil may be asked whether he believes the statement, what other facts he can suggest which are consistent with it, and whether the statement disagrees with what he believes to be the truth. Care should be taken, however, to avoid cultivation of an attitude of skepticism. The goal of training of a critical point of view should be to create an attitude that, because a statement appears upon a printed page or is uttered by a reputable person, it is not necessarily true. Such analysis may be associated with training in problem solving, which may be introduced at an early age.

As children mature, training may be initiated in attitudes related to the desire to investigate both sides of an issue, to remain open to conviction until adequate evidence is available, and to appreciate the fact that evidence is often so incomplete that no final conclusion is warranted. They should be taught that facts have different meanings for different people and for this reason people do not think alike.

Training for desirable attitudes toward knowledge should preserve the emotional characteristics of attitudes. The purpose of training is not to deemotionalize attitudes or reduce them to colorless reasoned conclusions. Instead, the goal is to make the truth emotionally satisfying, in order that the individual may experience gratification from increased knowledge instead of the dissatisfying frustration of conflict between highly emotionalized beliefs and factual accuracy.

Success in training in attitudes depends ultimately upon the teacher. The teacher's intellectual integrity, willingness to admit error, receptivity to new facts and ideas, and disposition to deal logically with facts make lasting impressions upon pupils. Warmth of conviction should accompany teaching, since cultivation of attitudes requires both emotional and intellectual appeal. Cold formal facts lack the vitality to create points of view. Attitudes in children are most often patterned after example and may

be influenced more by the manifestations of attitudes by the teacher than by abstract precepts.

Certain principles that are related to the cultivation of "attitudes toward attitudes" are suggested:

1. Need for adequate data should be stressed. Statements for which insufficient positive or negative evidence is available should be accepted tentatively.

2. Assumptions should be distinguished from demonstrable facts.

3. When children achieve capacity to understand the significance of propaganda, they should be shown certain of its earmarks. It may be demonstrated in propaganda as a rule that (*a*) acceptance of a belief constitutes a profitable advantage to someone, (*b*) propagandist statements are unsupported by impartial investigation, (*c*) use of prestige of individuals speaking outside their fields of authority (halo effect) is frequent, and (*d*) effort is made to confuse the issue by irrelevant emotionalized appeal to beauty, glamour, and prejudice.

4. Opportunity should be given for experience in problem-solving situations, such as projects, which necessitate collecting evidence in advance of forming a conclusion. Inductive approach to problems affords training in proper methods by which conclusions are reached.

5. Respect for a field of knowledge should be maintained by insistence upon the highest standards that individuals are capable of meeting. Importance of subject matter to pupils individually may be emphasized by community applications, field trips, or motion pictures. Since personal meaning may signify emotional appeal as well as intelligibility, desire for correct statements of fact may be stimulated. When a field is significant to the teacher, points of view carry over during instruction from force of example.

6. Democratic procedures in the classroom are essential if desirable rapport between teacher and pupil is to be established. Formation of desired attitudes can occur only if free movement

of emotional influence is possible. Undemocratic procedures are effective barriers to the formation of good attitudes.

7. Tentative decisions should be reached as frequently as possible on the basis of available information and few questions left unsettled. Pupils should be urged to reach decisions, even though pupil and teacher disagree. Discussion followed by dictation of a point of view by the teacher lessens the pupil's satisfaction in participating. He considers his effort frustrated if another person's decision is imposed.

The discussion of training in generalized attitudes has implied that such training will automatically carry over into a wide variety of situations. Transfer of training readily takes place, however, only when it is given with such an aim in view. For this reason, all situations over which classroom instruction may exert an influence should be fully utilized for practice of desirable attitudes. Cultivation of such attitudes may be based upon the various procedures for dealing with learning material. In making assignments, in projects undertaken, in class discussion, and in testing, the teacher may emphasize types of response that provide training in approach to information and knowledge from desired points of view.

Similar opportunities may be found when the instructional material in a given course can be related to knowledge in other fields. Teachers in fields of physical and social science and of English find that the informational scope of such fields frequently extends to other subject-matter fields. The point of view that subject-matter fields are only artificial devices for localizing emphasis in learning is a desirable attitude.

Pupil-teacher relationships introduce opportunities to stress attitudes toward the facts of many issues that are unrelated to subject matter. Pupils often reveal outside experiences which a sympathetic teacher may assist them in dealing with adequately. Teaching is more than a selection of procedures best suited to securing acquisition of facts. An important result of attitudes

toward the use of facts will persist according to the manner in which facts are used. If the classroom is to cultivate lasting desirable attitudes, all opportunities for experiences that form and cultivate them will be used.

Attitude training is primarily provision of opportunity for formation of those attitudes which will supplant undesired attitudes and favorably influence the character of subsequent attitudes. Freedom of expression is essential, and classroom procedures must consider the dignity of the individual. Abundant information and training in the use of facts are important to the elimination of misconceptions and erroneous beliefs. The slow growth of attitudes suggests that training must be a gradual process and be embodied in the spirit of teaching. Many attitudes become rooted during early childhood; hence the importance of early training in realistic thinking is apparent.

Achieving Mature Viewpoints

The force and direction of an attitude in which the attitude-object is clearly defined may be readily determined objectively. Subjective judgment, however, is usually necessary when considering the extent to which the total aspects of children's attitudes satisfy acceptable standards of desirability. If the attitudes of a child differ from those of the individual who attempts to generalize regarding them, the latter is tempted to judge on the basis of his own convictions. An individual can detach himself only with difficulty from his own attitudes, particularly if his beliefs concerning people are highly emotionalized. Although an ideal point of view is impossible to achieve, it may be closely approached by an individual who can discern with a minimum of personal feeling the probable effects of a child's attitudes upon personality.

The attitudes that a child will form in certain social groups are different from those which he forms in others. There is advantage in considering separately various areas in which individuals

have attitudes. Horne [7] suggests classification of socially significant attitudes into eight categories: *personality, education, economic activities, family, government, social problems, recreation and exercise,* and *religion.* Such differentiation is made in the interests of simplification rather than complete accuracy. Many individuals in the case of these categories will tend to hold different types of attitude because of differences in the composition of "memberships" present in each category. For example, a child's school life contributes a majority of his views toward education because of contacts with teachers and other children. At home, influences of parents and siblings provide experiences that are absent in other areas of his environment. His attitudes within the family group may differ widely from his attitudes at school.

The following criteria suggest certain desirable characteristics of attitudes which may be encouraged during a child's development:

1. *Realistic Attitude toward Self.* Is the child generally happy in being able to discover solutions for personal problems? Is he confident of attaining success in activities attempted? Does he use initiative in redirecting his efforts when shifting of purposes and aims is necessary to make effort fully effective?

2. *Ability to Make Decisions.* Is the child willing to express points of view that are different from those of other people or does he usually accept without question the opinions of others? Does he maintain his convictions with sound argument, or is he reluctant to be certain of anything?

3. *Open-mindedness.* Is he willing to evaluate the possible truth of opinions that reflect attitudes different from his own? Is he willing to reevaluate his own attitudes by weighing both sides of an issue? Does he hold his judgment in reserve until he may hear all opinions? Is his ability to reach decisions and to postpone his decisions properly balanced?

[7] HORNE, E. P., Socially significant attitude-objects, Studies in Higher Education XXXI, *Bull. Purdue Univ.*, 1936, 37: 117-126.

4. *Receptivity to New Ideas.* Is he willing to accept new ideas or to investigate new techniques? Does he tend to be complacent concerning activities about him, or is he sensitive to evidences of opportunity for improvement?

5. *Socialmindedness.* Is he sympathetic toward society, or are his life interests selfish? Does he have respect for laws, or does he seek to evade them when it is profitable for him to do so? Is he willing to help other people, or is life a struggle for personal supremacy? Is he democratic, or does he prefer that certain individuals should dominate others?

6. *Freedom from Stereotyped Attitudes.* Does he blindly follow public opinion that tends to expand an assortment of favorable or unfavorable reactions into a blanket symbol to be accepted or rejected in its entirety? Does he, for example, really know anything about the socialism that he hears others acclaim or denounce? Does he take sides uncritically, or does he seek information and differentiate his beliefs by evaluating separately various aspects of socialism?

7. *Critical Attitudes.* Does he remain suggestible despite the influence of his textbooks and other reading and continue to accept superstitions and pseudo-scientific misconceptions? Does he apply his knowledge of science to verification of such beliefs?

8. *Understanding.* Is he accustomed to deal with new facts with desire to understand and relate them to his own experiences, or does he depend largely upon learning through memorization?

Various other criteria might be suggested to test the quality of attitudes. The criteria chosen should have for their purpose the determination of whether a child's attitudes are being influenced by ignorance and prejudice, or whether the influence of the school in dealing with facts and opinions is being felt.

PROBLEMS FOR DISCUSSION

1. *Superstitions, beliefs, notions, prejudices,* and *ethical ideals* have much in common with attitudes. Suggest definitions

of these terms that will clarify their origin and the manner in which they affect behavior.

2. To what extent may an attitude be a product of unbiased objective thinking or be essentially the emotional residue of past experiences? Comment on the statement: "A man convinced against his will remains of the same opinion still."
3. Suggest relationships between the strength of an attitude and various extremes of personality traits.
4. In what respects are many influences creating or modifying attitudes discontinuous? Discuss the significance of consistent emphasis when desired attitudes are being cultivated among children.
5. Account for the resistance that may develop if an individual becomes aware that someone is seeking to modify some attitude. Why is informing a child that he has a bad attitude a faulty approach to its correction?
6. Discuss variability in the magnitude of an attitude-object and the direction of an attitude.
7. How are attitudes significant as determiners of an individual's thoughts and actions? Speculate upon the chaos that would result from the obliteration of all attitudes.
8. To what extent may development in attitudes be observed in a child during his school years?
9. Evaluate the statement that attitudes among members of the same family or social group tend to be more similar than among individuals selected at random.
10. Do indifferent attitudes appear to be more prevalent than strong ones? Of what significance to a teacher is the fact that many attitudes of children are almost neutral?
11. Outline certain attitudes that appear of greatest value (*a*) in classroom relationships and (*b*) as long-range educational outcomes.
12. To what extent is indoctrination inevitable in the classroom? Consider indoctrination with respect to (*a*) treatment of controversial issues, (*b*) habits of thinking inconsistent with

attitudes of home or religious environment, and (*c*) appropriateness as a means of guarding such social ideals as the American way of life.

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CHAPTER V

Emotional and Social Maturity

Education should prepare people to take life in their stride. It should enable them to capitalize on their opportunities and profit from their failures. This educational need of all individuals for control of themselves in the daily circumstances of effective social living has led schools everywhere to provide measures for the emotional and social guidance of their pupils.

The undesirable trends in our social system, manifested in waves of juvenile delinquency, mounting divorce rates, disintegration of ethical codes, weakening of home solidity, and even psychopathic abnormality, are indicative of increasing emotional instability or lack of knowledge of how to deal with one's self effectively. Teachers tend to be no better prepared emotionally for life than the general population. Some surveys indicate that the exacting demands of the profession encourage a relatively high degree of emotional maladjustment as compared with that of other occupations. Since a teacher cannot give more than he has, consideration must also be given to his needs.

Why Children "Behave"

In order to understand the motives controlling an individual's behavior and to direct them properly, we must consider his basic

demands upon life. He feels entitled to security in home, community, and school, with assurance of protection and care. He seeks recognition as an individual, being conscious of his distinctive identity. He wishes to be approved and to have harmonious relationships with other persons. Threats to his expectations in life impel him to seek ways by which he may modify his environment or relate himself to it more satisfactorily.

According to his success in meeting life requirements, his emotional state may reflect pleasure or displeasure, fear or confidence, anger or cordiality, elation or depression. Classroom experiences always affect him in one way or another. He also brings with him to school the emotions created outside the classroom. The essence of his behavior, whether it is in his learning or in his conduct, is adjustment activity. As teachers, we motivate specifically for effective effort to learn. We may likewise arouse in the child emotions that will manifest themselves in general behavior. Actually, we cannot induce good learning or bring about other kinds of behavior unless we personally influence human action by self-control in trying circumstances and by an even, kindly personality. Every person wields an influence whether he is conscious of it or not.

Child behavior must be regarded as far more than spontaneous effort to satisfy immediate desires. Somewhere behind a child's act a reason exists, and the act itself is dictated by his motives. Children are neither good nor bad by nature. Their behavior is labeled good or bad according to their success in making adjustments that receive the approval of those who deal with them. If we regard a child's behavior as effort to adjust to standards of society, we shall be more likely to regard it in its true light and to become more interested in helping him than in punishing him for mistakes. If children are taught adequate ways of obtaining from their relationships with society the satisfactions that their lives require, fewer behavior problems are likely to occur. It is in the case of efforts to adjust to a life that meet with conflicting forces that emotional redirection is essential.

Motives are often in conflict within the individual, and his choice of behavior may lie among several possibilities. Ways in which a single dominating emotional state expresses itself may be numerous. A child who is disturbed because he makes unsatisfactory play adjustments with his companions may seek forgetfulness in intensive effort toward high scholastic achievement. On the other hand, he may commit overt and noisy acts in the classroom in order to attract attention. He may also seek solution of his problem by withdrawing from all but the most necessary contacts with others and sitting quietly in class as an unhappy, perplexed person.

To discover the underlying causes of behavior is often difficult, since causes seldom operate singly. The original cause may have become confused with secondary causes, which frequently persist after the first has been forgotten. Overt acts are often unrelated to the motives that prompt them.

Cultivation of a child's emotional and social development means teaching him acceptable ways of utilizing his emotional energy and preparing him to live at peace with himself and with society. It means establishment of such harmony within him that he will not be tormented by fears, doubts, feelings of guilt, unwholesome repressions, or inclinations toward aggressiveness or belligerency in attaining his purposes. We wish him to be happy in the classroom, at ease among his companions, in good rapport with his teachers, and with initiative and ability to assert himself positively.

Inadequate Modes of Adjustment

Individuals employ various devices for disguising their manner of solving social and emotional problems. In doing so, their purpose is that of achieving a semblance of success that will maintain self-esteem and also "save face" before others. These devices are typically used when obstacles impeding the solution of a problem cannot be removed or the problem adequately solved by direct means. It is important to recognize such vagaries of be-

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havior in order to penetrate the disguise of certain acts and thus to know what a pupil is actually striving to obtain. These devices are not intrinsically undesirable. They become so when freely used as substitutes for the necessity of facing reality. A few of the common devices will be outlined.

Compensation. An individual compensates when, for example, he concludes that, although he lacks ability to become a tennis star, he may make a social asset of his violin playing. In this decision his purpose remains much the same, but he has chosen a more mature, promising, and equally acceptable means of attaining it. A teacher may legitimately foster compensation by encouraging pupils to direct energy toward activities in which they may be successful, after it has become obvious that other activities will result only in failure. In other situations, however, compensation may be utilized to conceal weakness. A shy, retiring individual, who achieves little social success in ways that are natural to him, may seek to gain his end through blustering, overbearing manners, or aggression.

Rationalization. This type of adjustment is used by persons who are unwilling to confess the true reason for an act but prefer to justify it through fallacious reasoning. A child may offer as an excuse for tardiness the explanation that his breakfast was not ready for him but be unwilling to confess that it was he who was late in appearing for breakfast. When a child is detected in a misdemeanor, it is often unwise to insist upon a complete explanation, since he may be thus encouraged to rationalize. A person who rationalizes is frequently deceived by his own illogical reasoning so as to regard not only the act as justifiable but his explanation as valid. If he were fully aware that his arguments were deceptive, he would actually be lying, since he would be deceiving others although not himself. The fable of Aesop illustrates a common variant of rationalization indulged in by the fox who could not reach the grapes and so asserted that they were sour.

Daydreaming. Indulgence in fantasy for the purpose of prolonging an experience beyond the bounds of reality or ability of attainment represents a withdrawing type of behavior. Following an unsuccessful argument with someone, an immature person may in reverie mentally restore the situation in so distorted a form that for the time being his arguments may be convincing and he may literally terrify his opponent into submission. Daydreaming releases a tension which it is impossible to release through adjustment in reality.

Children normally indulge in occasional daydreaming when their opportunity for activities that they enjoy may not be possible. Sometimes normal activities that are unwisely repressed through disciplinary measures or bias of other children against them will be continued in a dream world of their own creation. Daydreaming that represents an escape from the necessity of dealing adequately with reality in order to obtain certain satisfactions must not be confused with constructive imaginative planning, during which an individual mentally traces the development of an idea or rehearses the future course of a contemplated activity. If indulged in to the exclusion of solving problems realistically, daydreaming may become the forerunner of serious mental disorder.

Projection. A teacher indulges in projection when censuring pupils for lack of interest in classroom activities when the fault actually lies in the uninspiring presentation of learning materials. Projection is typically the unconscious selection of a false cause-and-effect relationship. It is commonly observed when, for example, an individual kicks a stool with which he collides. Children often, for example, blame the teacher or textbook for their lack of success in mastery of subject matter when the actual cause lies in their failure to make diligent application.

Regression. Instead of making adjustment in a manner befitting their age, individuals sometimes revert to adjustments characteristic of an earlier age. Two adults may refuse to speak to one another as a childish gesture of contempt. Resorting to

outbursts of temper (not unlike temper tantrums) or crying and screaming is fairly frequent in overwrought adolescents or unstable adults. Overprotected children are sometimes deprived of normal experiences for learning mature modes of adjustment, and in adulthood may resubmit themselves to parental domination rather than to exercise independence of action. They prefer adjustment that is inadequate though seemingly safe, to adjustment that may be adequate but new and untested.

Avoidance. A certain amount of hesitancy is natural until an individual acquires the necessary mental preparedness to undertake a new experience. Sometimes, however, a relatively minor failure during initial attempts in a new experience creates a strong disinclination ever to enter again a situation in which such failure may be repeated. A pupil may have initial difficulties in subject matter that is new to him and, upon discovering no solution for such difficulties, avoid participation in further classroom activities. He is likely to express a dislike for the subject matter and argue that the course is a waste of time. Instead of attempting to overcome or by-pass obstacles, he feels safer in rejecting the total situation.

Inhibition. The adjustment typified by inhibition is significant as a control of behavior when one discovers emotional barriers erected in the way of acts which in the light of common sense do not appear objectionable. Normal social relationships involve numerous desirable inhibitions, such as reluctance to accuse an individual of lying or to "talk back" to a teacher. But when a girl is too embarrassed in biology class to discuss the life cycle of a frog, or a boy too embarrassed to play a violin selection that he has memorized and perfected, inhibitions may be considered undesirable. Some inhibitions stem from outmoded conceptions of propriety, or previous embarrassing experiences, and require modification of one's established modes of thinking. The effect of inhibition is most acute when distracting states of indecision result.

Procrastination. This device is typical of a tendency to postpone meeting a problem in preference to meeting and solving it as promptly as possible. Unrecognized motives for evasion of an issue often accompany procrastination, such as the belief that, if one does nothing, he at least avoids a sin of commission, or the hope that time may afford an excuse for never having to solve the problem. The individual who procrastinates is often using postponement as a substitute for a negative decision but cannot decide to say "No." We often observe postponement of a pupil's book report until the approach of the dead line. The secret motive of the procrastinator in this case may be so to obligate himself to work in haste that his excuse for inferior work is in readiness. The trait may reflect a feeling of inadequacy, or it may also characterize the behavior of a perfectionist, who is unwilling to incur the risk of performing work of inferior quality without an excuse in prospect.

Refusal to Recognize Failure. Children often find difficulty in accepting themselves realistically but persist in effort toward levels of aspiration too high for their actual abilities. Some individuals may be encouraged by parents or friends to select activities for which they are unfit, and suffer through inability to attain the heights of their parents' ambitions for them. They may exhaust their energy in effort to make the football team when they possess neither skill nor strength. They may be chronically unhappy as a result of making the wrong choice of activities and yet be unable to make adequate compensation. Intelligent utilization of such failure is important to an individual's development of capacity for dealing with life situations.

Self-justification through Comparison with Inferiors. Some individuals maintain self-esteem by selecting as standards of comparison the low achievement of other persons. They tend to fear defeat if they adopt standards or select for comparison persons whose ability or ambition is comparable. Inferiority, when it may be compared with a still lower grade of inferiority, is transformed into relative superiority. Thus the individual's desire is

for a low grade of success. A pupil with excellent general background may seek to justify cheating on the ground that many less capable classmates are using that means of passing tests and sees no reason why he should use methods presenting greater difficulty. Within limits, an individual who has few opportunities for success may be excused for taking pride in a low grade of achievement. But it is usually desirable that his level of aspiration be consistent with his potential ability and not represent an opportunity for self-complacency without high requirements to be met.

Behavior Problems

In his selection of responses through trial-and-error methods, the individual frequently does not know how to choose an acceptable or desirable course of action. His situation, therefore, must be regarded as a problem which he may require help in solving. It is important to recognize the difficulty that he experiences as *his* problem. When his acts affect the fulfillment of our purposes, we often regard *his* problem as *ours*, judge its seriousness on such a basis, and solve it in accordance with our own standards. Obviously, our attempts to do so fail, since we do not help him solve *his* problem as his own.

Our conception of behavior should not be restricted to regarding it as *desirable* if the child is docile and tractable, or *undesirable* if he asserts himself against authority. The concept of behavior must include the child's emotional and social development in terms of broad patterns of conduct, his emerging traits of personality, and his general social outlook. We must consider such tendencies as the basis of overaggressiveness in asserting his intentions or passiveness in solving difficulties by refusing to face them. Many specific acts of behavior, such as stealing, destruction of school property, inattention in the classroom, and impertinence, are symptomatic of efforts to adjust. The seriousness of such behavior should be determined, not entirely by its significance according to adult standards, but by the importance of the offense to the child's own development. In the classroom,

throwing spitballs constitutes a more heinous offense than sitting quietly and avoiding participation because of timidity or shyness. The first type of behavior may be an irregular but not unjustifiable reaction to the tactics of an autocratic teacher, but the second is often given little attention because it does not break out into the open. As may be inferred, the seriousness of different kinds of behavior depends upon whose criteria are accepted. Obviously, setting the standards must take into account the frequency of undesirable acts as well as the age at which they occur. It will be helpful to examine a few types of behavior and to observe points of view toward their relative seriousness. The following list includes certain representative types:

Sexual irregularity
Cheating
Masturbation
Impertinence, defiance
Obscene notes, talk
Cruelty, bullying
Quarrelsomeness
Lack of interest
Truancy
Laziness
Selfishness
Smoking
Inattention
Fearfulness
Enuresis
Domineering
Interrupting
Whispering
Tardiness
Dreaminess
Slovenly appearance
Imaginative lying
Overcritical of others
Unsocialness
Shyness

No two adults would assign to these various kinds of behavior the relative importance that their ranking now suggests. The present order constitutes the general teacher attitude. Parents might hold more closely to moral standards, personal idiosyncrasies, family customs, and general adult standards. A still different arrangement of items might be made by a minister, a physician, or a police official.

The mental hygienist takes a point of view most widely divergent from that of teachers. His rating will list the activities

ranked in an almost reversed order, although recent investigation indicates a wholesome tendency for the divergence in point of view to become less marked. The mental hygienist, whose attitudes are not colored by self-interest, thinks objectively of the cumulative effect of children's acts upon themselves. His training has brought him into contact with mentally ill adults, those suffering from irreparable emotional and social maladjustment, and those whose inability to lead normal lives has been traced to childhood sources.

No lack of appreciation of moral values, however, is indicated. The mental hygienist merely believes that shyness, daydreaming, domineering, or fearfulness constitute a menace to the individual's full development. He considers lack of interest, impertinence, cheating, and release of sex tension relatively susceptible to re-education. In general, his emphasis is upon withdrawing or recessive personality traits, in which the individual is unhappy or depressed, suggestible or weak in volitional development, asocial, easily discouraged, sensitive, or morose.

Unwholesome repression and misdirected inhibitions more seriously limit an individual's opportunities for learning to live harmoniously with himself and others in adult life than do occasional transitory acts, which may be brought under effective control with no threat to wholesome social development. We must remember that, although every undesirable act of a child constitutes an unsuccessful attempt toward adjustment, it is not necessarily evidence of basic personality disorder. It may be random effort to discover a mode of adjustment that will meet a situation.

Changing Patterns of Behavior

It is a matter of conjecture whether behavior of children becomes more or less desirable with advance in age. Many specific types of behavior are abandoned as better ways of adjustments are learned. Young children rapidly outgrow the stage of temper tantrums and disposition to be contrary or negative. At later ages, fears seem to yield to an attitude of increasing confidence.

Cheating, as an effort to adjust, may be eliminated through redirected attitude toward schoolwork. Overt, undesirable acts that directly interfere with classroom management tend to disappear between the ages of 12 to 14 years.

Transitory types of behavior are usually not severely condemned when they occur at the time of their greatest prevalence, although their persistence at later ages is regarded as undesirable. It is important to think of emotional and social development as involving the outgrowing of many types of behavior as well as development of increasingly mature patterns. Children should not be begrudged the full measure of childhood experiences. Their appreciation of adult standards may be retarded if they are deprived of opportunity to learn personally the ineffectiveness of certain juvenile acts. Emphasis on emotional and social guidance should not seek the suppression of transitory types of behavior to the exclusion of effort to encourage early emergence of mature patterns within their reach.

Broad patterns slowly emerge; with increase in age, behavior becomes more stable and predictable. Adjustments of older children tend to follow increasingly generalized trends. During the second decade, traits of personality take definite shape.

Changes with Age

Figure 18 [1] is presented in order to show changes in four types of behavior. It may be observed that timidity and fighting, which are frequent during early ages, reach minimum frequency between the ages of 15 to 16 years. On the other hand, the frequency trend of impertinence and sulkiness is generally upward, reaching maximum at the ages of 15 to 16 years.

The average number of personality difficulties is believed to increase regularly for both sexes up to the age of 12 years. This

[1] BLATZ, W. E., S. N. F. CHANT, and M. D. SALTER, Emotional episodes in the child of school age, p. 14, University of Toronto Studies, Child Development Series, No. 9, University of Toronto Press, 1937.

trend may be observed in Fig. 19,[2] in which the "personality total" based on number of personality problems is shown in relationship to chronological ages up to 17 years. Beyond this age a decrease in frequency is noted, with a slight increase again at

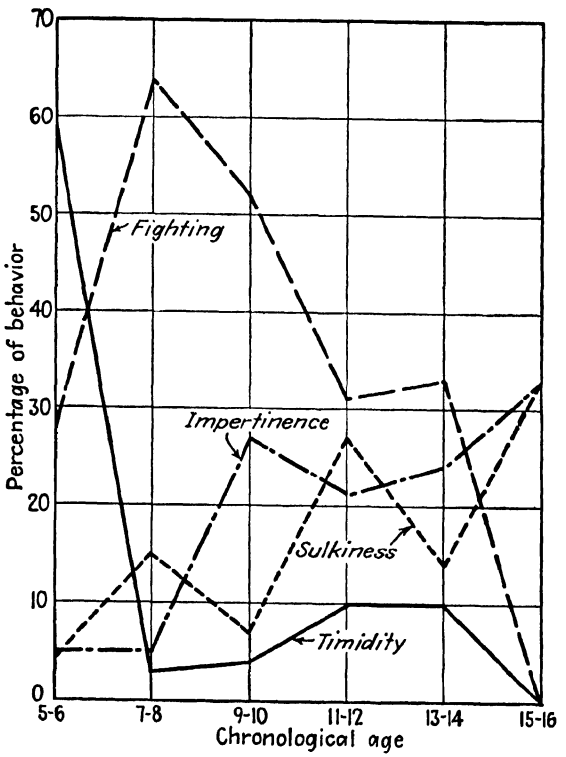


FIG. 18.—Changes of behavior with chronological age for school pupils.

the age of 17 years. Conduct problems in the case of boys become more frequent with increase in age up to 10 or 11 years, with a decline in frequency about that time. They appear to increase similarly in the case of girls up to the ages of 12 or 13 years before a decline occurs. At the age of 17 years the frequency rises again, with a sharper rise, however, for girls than for boys.

[2] ACKERSON, L., *Children's Behavior Problems*, p. 122, University of Chicago Press, Chicago, 1931.

Types of behavior problem that decrease with age include enuresis, temper tantrums, spoiled-child attitude, restlessness, distractibility, destructiveness, and violence. Traits that increase in frequency with age include depressed attitudes, daydreaming, laziness, feelings of inferiority, and sex misdemeanors. Little connection with age is found in egocentric attitude, selfishness,

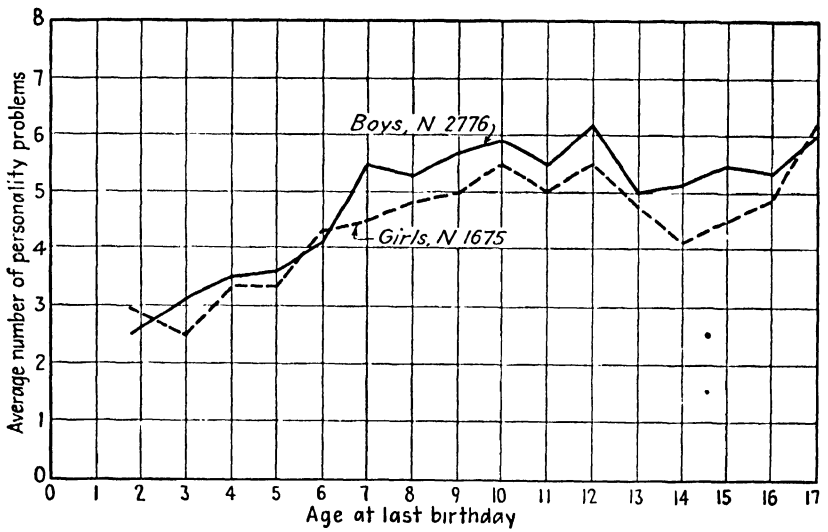


FIG. 19.—Relation of "personality total" to chronological age, I.Q.'s 0 to 159.

queerness, sneakiness, emotional instability, or boastfulness. In the case of younger children, much behavior is accompanied by physical action, but a gradual transformation into verbal forms of expression accompanies increase in age and maturity. The training of girls is reflected in an earlier manifested tendency to express themselves verbally rather than in overt action.

The rise in frequency of behavior problems at the age of 17 undoubtedly reflects the peak at which adolescent problems become most insistent. The period is characterized by a wide variety of problems, resulting from changes of relationships with family, point of view toward the other sex, and outlook toward a socioeconomic future. More causes for conflict may be expected around the ages of 17 and 18 years when the individual

has marshaled a majority of forces necessary for a definite assertion of adulthood. When his claim to adult status has been recognized, less difficulty in adjustment may be expected.

Relationships to Intelligence

Below a certain level of intelligence children tend to display feelings of inferiority, having disposition to overcompensate in a variety of acts, such as impertinence, bullying, aggressiveness, or sullenness. Laycock [3] investigated types of behavior and the frequency of their occurrence by comparing groups of children whose median intelligence quotients were 121 and 78, respectively. Teachers and parents rated their general behavior. Children of the inferior group were significantly oversensitive and displayed recessive traits, such as self-consciousness and suggestibility. Among their negative or aggressive traits were found stubbornness, sulkiness, and domineering. Inferior children tended to seek companions younger than themselves. They lacked ability to dominate children of their own ages.

The explanation is suggested that inferior children find few opportunities for scholastic success in classrooms in which inflexible scholastic standards prevail. Their low grades are unfavorably compared by their parents with those of bright children, and they are constantly reminded of their scholastic inferiority. Their general behavior strategy seems to be to overcome frustration in one type of activity with compensatory adjustment in other activities designed to secure recognition. An attitude of superiority was manifested in some instances by children of the higher intelligence levels. It is inferred that the inferior children felt the force of their depreciatory attitude.

Bright children, however, are frequently found to be engaged in behavior in which their intelligence is used for undesirable purposes. Their aggressiveness is found more often in mental

[3] LAYCOCK, S. R., Adjustments of superior and inferior school children, *J. Soc. Psychol.*, 1933, 4: 353-366.

action than in physical, and oftener than dull children they display antisocial behavior, such as obstinacy and cheating.

Problem behavior is found among children on all levels of intelligence from the feebleminded to the gifted. One investigator reported discovery of a peak of frequency at the level of intelligence between the I.Q.'s of 80 and 90. An inescapable relationship with age appears to exist with respect to the prevalence of behavior problems on the various grade levels. The relatively inferior adjustment of over-age pupils undoubtedly is related to the total picture. Overt traits appear more pronounced on the lower levels of age and intelligence. Age and intelligence seem to operate jointly in their observed relationship with the number of behavior difficulties. Less likelihood appears for the modification of undesirable behavior in the case of children having I.Q.'s of 80 and below than of those on the higher levels of intelligence where certain improvement may be expected between the ages of 11 and 17 years.

Tendencies in Certain Personality Traits

Among the following types of behavior are the variable relationships with age, intelligence, and sex:

1. *Daydreaming* or indulgence in fantasy is seldom observed before the age of 7 years. Incidence of this type of behavior remains almost constant in the case of boys but increases with girls to at least the age of 17 years. It may be suspected that more restrictions on the behavior of girls creates a greater desire to seek vicarious experiences through daydreaming. Among all children, daydreaming increases on the higher levels of intelligence, a fact indicating greater capacity for imagination and a greater number of unsatisfied situations.

2. *Inferiority feelings* increase with age beginning with the age of 7 years, and seem to be associated with relatively high and low levels of intelligence. Explanation may be seen in the supe-

[4] ACKERSON, *op. cit.*, p. 257.

rior ability of the average child to meet social requirements on his own highly populated level. Inferior children frequently experience frustrations through inability to follow the average pace in scholastic achievement. Superior children are often bewildered by the failure of their relatively mature ideas to meet with general acceptance in their social group.

3. *Psychopathic personality,* manifested in a tendency to be egocentric, inadequate, emotionally unstable, impulsive, or schizoid or shut-in, tends to maintain a uniform incidence for all ages beyond infancy until the ages of 16 or 17, when a sharp rise is noted. Among older children, its tendency is to be more frequent with increase in intelligence level.

4. *Mental conflict* appears to be more frequent among children on the higher intelligence levels, as may be expected from the general inclination of such children to deal with problems of life intellectually. It is probable that many of their problems are more significant to them emotionally than to average children.

5. *Bashfulness and shyness* are more common between the ages of 6 and 10 than at any other ages but are not significantly associated with intelligence. Many isolated cases, however, are found on the very high intelligence levels. The traits occur with slightly greater frequency among girls, particularly during the early ages.

6. *Bullying* is almost exclusively a trait of boys and occurs with uniform frequency between the ages of 9 to 15 years. It appears without great variation of incidence in the average intelligence range among young boys. There is a tendency for it to increase in older boys with increase of intelligence quotients from 60 to 99. Beyond this level it occurs rarely.

Influence of the School

In order to stimulate wholesome emotional and social development, the school must attract children and offer them satisfying experiences. It should be a place in which the child, regardless of conditions outside the school, may find sympathy and understanding. The home and community are obviously important

sources of emotional disturbance. Causes for many behavior problems are to be found outside the school, and serious situations undoubtedly necessitate full investigation. A majority of behavior problems, however, may be made less serious if relationships within the school are satisfactory. Some of these relationships within the school will be outlined.

Relationships between Teacher and Pupil

The extent to which a pupil works in harmony with classroom purposes may hinge upon the attitude that the teacher creates in him. It is axiomatic that pupils make better responses for a teacher whom they like than for one whom they dislike. Every word and act of the teacher affect each pupil, often in different ways, creating feelings that include the negative ones of unhappiness, antagonism, or disgust.

Likewise, the teacher is affected by the words and acts of pupils. Certain groups stimulate good teaching more than others. It is no less true of teachers than of pupils that attitudes generated by the classroom setting determine the quality of work accomplished as well as affect the quality of teaching performed. The entire group constitutes a unique human situation, representing not only the influence of two levels of maturity one upon the other, but the impressions that each person creates in every other person. Each individual in the classroom brings with him a different pattern of emotional and social behavior which has accumulated from experiences outside the school and from those which the school setting has created.

A point of view difficult for the teacher to maintain is that, except for stage of development, pupils are not so unlike adults as is often assumed. In fact, if the teachers of adolescents and younger children were required occasionally to instruct adults, they would quickly discover the effect of methods involving display of authority and those manifesting poorly developed understanding of human nature. Adults tend to make their opinions known, whereas children accept "authoritarian" teaching, though

sometimes in silent rebellion. Children do not expect to be treated as adults. They recognize their immaturity and accept the desirability of older and more experienced leadership. Their reactions toward teachers, however, leave one convinced that they react unfavorably to arbitrary domination, lack of respect for them as individuals, unfair treatment, and failure to reward earnestness in their effort. If teachers treated adult acquaintances with as little consideration and subtlety as many of them treat their pupils, they would be among the most cordially disliked people in the community. Few complaints of pupils against teachers involve criticism much different from those which one adult might level against another for similar behavior.

Children have good opinions of teachers whose teaching is effective by reason of ability to deal constructively with people. They like to see the classroom properly organized, subject matter presented in the light of definite aims, each individual engaged in some activity from which he can profit, the teacher interested in showing each pupil how he may make improvement. Pupils admire and respect a teacher who can maintain discipline in the sense that interest and enthusiasm bring about willing cooperation of all members of the group. Children like an orderly, well-regulated classroom. They have only condemnation for discipline that is unreasonably imposed as though by divine right of schoolmasters. The explanation is undoubtedly that the whole setting contributes toward success, for the success motive is one of the compelling forces in a child's outlook.

In a study [5] of relationships between pupils and teachers in the high school, pupil opinions of teachers were compared with teacher ratings by supervisors with respect to discipline. The criterion of satisfactory discipline was the extent to which the classroom was a self-regulating unit and could dispense with the aid of the administration in dealing with undesirable behavior. The correlation of pupil with supervisor ratings was found to

[5] BUSH, R. N., A study of student-teacher relationships, *J. Educ. Res.*, 1942, 35: 645-656.

be +.90, a fact which indicates that teachers who can handle their relationships well with pupils in the opinion of supervisors are also considered good teachers by pupils.

A further relationship between pupils' desire for success and their contacts with the teacher was a tendency of pupils who rated highly in achievement to give the teacher a higher rating than pupils who made low achievement. It is obvious that many pupils consider the teacher at fault for low achievement, but it is significant that their success in the classroom was associated with the teacher's effectiveness.

In another study [6] of relationships between pupils and teachers in a junior-high-school setting, the dislikes of pupils expressed in their own words were solicited and found to fall into six classifications. Teachers were not liked who (1) ridicule, use sarcasm, nag; (2) threaten, frighten, punish, in order to secure discipline; (3) are dominating and autocratic; (4) show partiality; (5) fail to provide for pupil differences; and (6) have disagreeable personal peculiarities. Certain complaints by individuals are interesting: "So harsh that she scares me," "Always talks about herself and her relatives," "No sense of humor," "Never compliments or encourages," "Goes frantic at every little noise," "Doesn't like boys," and "Does not pay any attention to some pupils."

By inference, teachers who are liked are kind and friendly, happy to give help, explain clearly, are neat and tidy, have a sense of humor, understand children, encourage children to do things for them, and are friendly outside school. Pupils who discover evidences of friendliness, cheerfulness, and fair-mindedness will tolerate an otherwise "bad" teacher. It does not require the whole gamut of desirable qualities to convince pupils that they are liked and respected.

As a rule, pupils like teachers who like them, and it will become evident as one studies the influence of teacher personality traits upon pupils how contagious human emotions are. If teach-

[6] TIEDEMANN, S. C., A study of pupil-teacher relationships, *J. Educ. Res.*, 1942, 35: 657-664.

ers are aloof, irritating, and indifferent, emotions involving similar behavior are generated in pupils. On the contrary, if teachers are disposed to be friendly and considerate, pupils are likely to exhibit the same qualities.

Objectivity in treatment seems to influence importantly other relationships. Impartiality will manifest itself in the management of tests and examinations that will not permit prejudice in scoring. It will be shown in giving each pupil work he can do and thus not ignoring him as unimportant, distributing participation so that all pupils have opportunity, giving help and advice freely, and in general creating equal opportunity. Impartiality does not mean, however, that pupil differences will be overlooked. Their recognition ensures greater fairness to all, bright or dull.

Children possess many admirable qualities which we sometimes wish adult life did not modify. Although they are more sensitive than adults to unfriendly approach and lack emotional maturity, their ideas concerning how they should be treated are less prejudiced. Two boys may engage in a violent quarrel but in a few days be again on friendly terms. If two adults quarrel, their prejudices and ruffled feelings may persist for months. In general, children are fully as fair to their teachers as their teachers are to them; and they are usually more candid in expressing likes and dislikes. Similarly, they are more responsive to kindness. They are probably more inclined than adults to accept people on the basis of their few good traits and not to insist upon rigid standards in all qualities. These facts indicate that the teacher's disposition to be kind is likely to be accepted at face value, that proper treatment will be quickly sensed, and that effort to become acquainted as a rule will be favorably received.

Much of the teacher's emotional expression is the product of development through childhood stages, of which many experiences persist as memories. In the classroom, contacts with immature emotional and social reactions create temptation to revert to that level in dealing with pupils. The tendency may be no more characteristic of teachers than of adults in general to mani-

fest occasional infantile modes of response. But situations in the classroom favor doing so more than those in occupations populated by adults. Teachers who lose their tempers behave childishly.

Varied childhood emotional experiences and their recollection are valuable assets to a teacher wishing to understand children. It is easy to forget one's childhood. Some teachers cannot understand normal children because they themselves were not normal children. Others remember their childhood happiness so vividly that they are tempted to relive parts of it in the lives of children who surround them. Well-poised adult emotions should have come to the fore in a teacher, with memories of the past serving only as a basis for understanding children, not for being like them.

Many teachers fail to establish satisfactory rapport with pupils because they resort to inadequate types of behavior, which are as unpleasant in them as in any adult. Domination and unreasonable demands on pupils are often cited as evidence that the classroom is the only place in which many teachers may compensate for unhappy private life, since the classroom affords excellent opportunities for giving orders instead of taking them.

Personal peculiarities may be manifested in such matters as dress, odd mannerisms, care of the person, and riding one's hobby in public. Where contacts are as personal as they must be while teaching, pupils may be especially critical of a teacher. Among themselves they talk freely about a teacher's clothing, commenting on its neatness, style, and care. Physical defects are usually noticed, but their effect is negligible if a good impression is otherwise created. Teacher personality is displayed in personal appearance and habits. Well-balanced emotions are associated with people whose appearance expresses culture and refinement.

An effective means of securing pupil cooperation lies in making definite effort to get acquainted. Through personal contacts the teacher may reveal traits of personality for which the classroom provides few opportunities. Knowing pupils personally decreases

formality of relationships between pupil and teacher, and each may discover that the other is more "human" than supposed. Pupils have great difficulty in thinking of a teacher as a personable, everyday individual, since the repetitive routine of the classroom tends to identify the teacher with rigidly fixed notions.

Pupils, through personal acquaintance, may become encouraged to reveal their own background and their interests and to display traits that teachers find interesting. Some teachers ask pupils to jot down on file cards specified information concerning themselves and use this information to govern occasional references to a pupil's personal life, an act that reveals the teacher's interest in the pupil as an individual.

In general, pupils have unsatisfactory relationships with maladjusted teachers and prefer well-adjusted leadership, which can reach down to their level without display of infantile emotions, without condescension, and with ability to demonstrate mature emotional patterns. The qualities that pupils like most are those of a well-adjusted individual who can get along with people in the outside world and be well liked even though classroom manners are used. Satisfactory ways of dealing with adults also operate in the classroom, provided they do not make undue intellectual or emotional demands of pupils.

Pupil Relationships to Classroom Activity

In continuance of the principle that the most desirable surroundings for pupils are those which provide security, personal recognition, and opportunity to express themselves and to make harmonious adjustments, possible sources of maladjustment inherent in classroom activities should be examined.

No child feels that he "belongs" in a classroom unless he is able to experience reasonable success in his work. A cause of difficulty lies in the fact that a course often makes uniform demands of all individuals regardless of ability or special interest. The pupil who cannot satisfy fixed standards makes various adjustments, among which many are undesirable. He may sit quietly

but be inattentive, perhaps busying himself with aimless decoration of his textbook or letting his thoughts stray in the direction of activities that he might perform with greater success. If classwork is adjusted to a degree of difficulty within his ability, he may be expected to work at it with some degree of effort. Proper grading of classroom activities in order that all pupils may obtain satisfaction in effort toward mastery is an important principle for creating the feeling of "belongingness" which they desire.

The child's feeling of belongingness may also be endangered if he is not given opportunity for participation in classwork. Almost every class includes two or three individuals who contribute aggressively to class discussion. Occasionally the teacher mistakes the interest of these individuals for evidence of teaching success and readily assumes the attitude that, if a few pupils interpret the assignment adequately and clearly, the work of the day has been a success.

An important emotional effect results from the extent to which pupils are required to be responsible for their own work and to achieve success without excessive guidance. It is often easier for a teacher to point out the exact point in an arithmetical computation where the pupil has made an error than to emphasize accurate habits and efficient techniques by which the pupil may discover his own mistakes and be able to regard the eventually successful solution as his own work. Proper direction may be given but not beyond the point where it may cripple initiative and independence. Pupils who are helped excessively fail to achieve wholesome emotional growth, for the feeling of inferiority is under constant cultivation with the attitude of adequacy largely ignored.

A fundamental error in dealing with children is that of not encouraging them to exercise self-responsibility or to make their own decisions. As soon as a child is able to assume responsibility, we should refrain from dictating what he shall do. We may train for self-responsibility and self-discipline in his classroom activities

by discouraging his dependence upon others. We may make him see that through cheating and getting assistance from others he is weakening himself. In expecting self-responsibility, however, we should make the burdens no heavier than a pupil can bear.

Tests and examinations are frequently cited as elements in a course of instruction in which the teacher's purposes diverge most widely from those of pupils. Where they are designed to meet standards, the emotional result may be undesirable. Many feelings may be induced, such as fear of failure, frustration of hope for success, threat of security in the class, resentment toward possible unfairness, and confusion regarding purposes. From an emotional standpoint, tests and examinations should be made to harmonize with pupil effort, setting standards no higher than those which the pupils have been able to meet in day-to-day performance and representing types of ability in which they have been given opportunity for practice.

The degree to which tests have resulted in good attitudes may be judged by the extent to which the pupil's feelings are similar to those displayed during other class activities. If pupils regard a test as an opportunity to do well, the emotional effect is good. If a test creates uneasiness, fear, or resentment, the emotional effect is bad. In a manner similar to other classroom procedures, the less teacher-centered the approach, the more likely pupils are to look upon a test as a contribution to their own purposes. As a practical exercise for demonstrating that tests are definitely connected with what is expected from their treatment of the subject matter, pupils may be permitted sometimes to engage in the preparation of an appropriate test which they may also be permitted to take, following refinement of its form by the teacher.

Social Setting of the Classroom

Child society is concerned with childhood's own problems, which include play, amusements, and relationships between its own members, as well as with such controlling agencies in the

adult world as parents and teachers. In large measure it erects its own distinctive standards of likes and dislikes, honesty, and morality. Children are highly sensitive to public opinion of child society. They also develop mutual loyalties, learning, for example, that tattling is an important taboo. This society often seems collectively involved in certain conflicts with parents. A child, having been refused permission to attend a movie, informs his mother, "You ought to let me go. All the other kids are going."

Almost every classroom group has possibilities for establishing a framework of social principles. A degree of socialized organization favors friendly atmosphere within the class and the teacher may become identified in the common purpose through the subtle effect of directing activities in terms of "we" instead of "I." The class group may be recognized as most vitally affected by undesirable behavior and encouraged to use its pressure upon those who infringe upon its rights.

Sometimes a teacher must intervene with subtle influence in order to enable a pupil to win acceptance by the group. His standing among his classmates may determine the quality of his work because of the emotional states favorable or unfavorable to effective work. Presentation of a report on a project may necessitate addressing the class on how the project was conducted and what it demonstrated. Some pupils talk freely before a group, whereas others are shy and awkward. Former experiences undoubtedly condition an individual for success or failure in speaking in the presence of others, but in a given case a pupil's social status in his present surroundings may influence his performance. His classmates may not like him or may have found him an interesting person for group ridicule. On the other hand, he may enjoy prestige among them and be immune to discouragement.

A shy pupil may appropriately be given a project that involves a practical demonstration, and the attention of a hostile group be diverted from the speaker to the intrinsic interest of the exhibit. His special abilities in woodcraft or drawing, for example,

may be utilized in the project, with the result that the shy boy or girl may be successful through being individual. Thought as to the type of offering may disclose various ways of enabling a pupil to gain small but definite success.

In some classrooms, competition becomes so intense that pupils actually wish to see a fellow member fail to make a good contribution, in order that one of them, or a group that he represents, may supplant him in prestige. The displaced member of the group, however, may become as eager as anyone else that his successor shall also fail. The atmosphere becomes charged with desire to find mistakes in someone else's work, and a sarcastic remark by the teacher encourages the group in such an attitude. Such tactics are emotionally distressing to many pupils who might otherwise make good contributions. The cumulative effect is particularly marked on pupils who are susceptible to adverse criticism and inclined to be sensitive.

Misdirected competition may not always be maliciously or selfishly destructive but constitute overeagerness on the part of certain pupils to assume leadership. The best method of avoiding such behavior is to seek an intellectual, democratic spirit in the class and cultivate adherence to simple parliamentary rules. Diplomacy in the classroom involves the cultivation of group attitude against behavior that interferes with normal activities. The cooperation of pupils pays big dividends in the amount of work that will be accomplished with minimum emotional tension.

Achieving Emotional and Social Maturity

If sound judgments are to be formed concerning the general patterns of emotional and social adjustment being established in children, it is important to consider certain types of behavior that are indicative of desirable adjustment. During the course of instruction pupils reveal in their behavior characteristic emotional and social traits. What the teacher thus observes may be interpreted as evidence concerning the state of the pupil's emotional and social health.

Emotional and social maturity is at best a relative developmental stage. Modifications of behavior occur during an individual's entire life, although maturity is commonly thought of as occurring sometime during postadolescence or early adulthood. One point of view is that emotional maturity is reached when the individual makes decisions without the organized guidance or control that is typical of his first two decades of life. On the other hand, to accept as the sole criterion of maturity his release from restraint of home and school oversimplifies the situation. Many individuals achieve a high degree of emotional and social competence at an early age, whereas others remain immature in many traits during their lifetime. The most practical basis for evaluating maturity is to judge the extent to which an individual possesses qualities that are commonly found among those of well-adjusted persons.

Children will be typically found at various stages of development toward emotional and social maturity. It is necessary to take into account a given child's age and also the normal range of personality development characteristic of similar children. Practical evaluation of the child involves use of good judgment, since the techniques of objective measurement of emotional and social status are seldom available in the typical classroom. The desirable traits that we shall suggest may be interpreted as representative standards of maturity. In children we may expect only partial approach to such standards. A child may be regarded as a satisfactorily adjusted individual if his behavior reflects progress toward attainment in the following qualities:

Good Sportsmanship. The child is a good winner and a good loser. He works and plays in accordance with rules and notions of fair play. His attitude is neither extremely dominating nor submissive.

Acceptance by Other Children. Other children are happy to include him in games and activities. He is usually interested in participating and understands the use of necessary social man-

ners. He possesses the art of mingling harmoniously with his associates.

Objective Viewpoint. He can look at himself without prejudice, accept criticism without resentment, and does not demand complete success in all activities. He does not expect to receive undue attention but in the classroom takes his turn as a matter of course.

Happiness in School. The work of the classroom and other activities of the school interest him. He seems happy and cheerful in most situations. He enjoys the stimulation of school activities and does not attempt to avoid social contacts and responsibilities.

Poise and Confidence. He can express himself without timidity in the classroom and in the presence of large groups of pupils. Fear and embarrassment are absent in his school activities. In the classroom he willingly asks questions if he does not understand or if he wishes a subject to be further developed.

Concentration. He is able to discover sufficient meaning in school tasks to give them exclusive attention for reasonable periods of time. He is capable of working at one task at a time, without yielding to the distraction of conflicting purposes. When reciting, he does not resort to evasion to conceal lack of preparation or try to divert discussion into interesting but irrelevant channels.

Self-responsibility. He solves his own school problems, without leaning excessively upon others for guidance or assistance. He knows the satisfaction of achievement through personal effort and wishes recognition for no accomplishment unless it be his own. He regards schoolwork as his personal duty and requires no pressure from others. He is punctual in his appointments. He is generally willing to accept blame for errors, without making excuses.

Interests. He has several interests outside school, as well as some among extracurricular school activities. He is generally

considered a busy child, usually making constructive use of free time.

Realistic Attitude. He faces problems squarely, without unwholesome use of withdrawing types of behavior, such as daydreaming or avoidance. He is able to secure satisfaction of wants through acceptable ways of dealing with reality and has no need of pseudo adjustments.

Initiative. He participates in originating and developing ideas and is willing to make changes. He volunteers suggestions for increasing the value of the classroom work and makes a personal effort to promote worth-while activities. His thoughts are constructively absorbed in the possibilities of his surroundings. He is resourceful and likes improvement.

Sex Viewpoint. He is guided by common proprieties regarding sex and maintains a wholesome point of view. His interest in the opposite sex is characteristically mature at adolescence, and he will normally seek opportunity for companionship with both sexes. Adjustment at this stage is an important factor in ensuring well-balanced adult emotions.

Ethical Standards. He has principles of rightness and wrongness in personal conduct, especially with respect to cheating, lying, and stealing. Good emotional and social development implies a high degree of character development. His methods of attaining his purposes do not require dishonesty.

The Teacher as a Person

The dignity of the teacher has shielded him from extensive discussion of his own behavior problems. Yet, in dealing with manifestations of pupil behavior, we have not disposed of the problem of the classroom. It is equally important to consider the possibilities of the teacher's personality as a constructive force in the total growth of pupils.

In children we frequently find the reflection of the same desirable and undesirable emotional qualities which their teachers display. Teachers who are irritable, unfriendly, and careless are

found to have pupils who manifest similar characteristics. Pupils who do their work in a businesslike manner, are considerate of the teacher, and who exhibit no fears in the classroom usually are found to have been associated with teachers who are calm, sympathetic, and stimulating. Social and emotional problems pass from individual to individual just as certainly as physical disease. One investigator suggests that the neurotic habits of a teacher may leave their effects as indelibly upon the child's personality as the ravages of smallpox. We are, therefore, justified in our concern about the relatively subtle effects of peculiarities in the teacher's personality upon children.

Emotional and social maturity is realized in an adult when he has achieved a satisfying balance in life's activities. Inner happiness is difficult to find if he is troubled by fears. Doubts, timidity, or anxieties hinder success by impeding command of one's self. Repression of certain normal tendencies during youth may cause adult expression to be emotionally painful. Persistent feelings of guilt resulting from memories of youthful experiences may inspire belief that he has suffered permanent damage and can never be a normal person. The constructive approach toward the achievement of a well-adjusted personality should begin with the appraisal of one's assets.

In the classroom and in other contacts with children, emotional and social relationships that exist in few other occupations create unique problems. Teachers deal with immature individuals and easily acquire qualities of their own which are not characteristically adult. Willingness of children to accept authority more graciously than adults often gives a teacher a feeling of power. Children who react according to childish patterns may seem rude and impertinent, and an overwrought teacher may easily mold the emotional aspects of the classroom setting so that it may afford opportunities for domination, petty successes, and acceptance of idiosyncrasies of personality not possible in adult situations. On the other hand, the teaching profession creates an emotional drain which must be replenished in other aspects

of a teacher's life. The poverty of adult emotional contacts in the school setting necessitates looking elsewhere for means of personal growth.

Since success in the guidance of a child's growth depends in large measure upon the personality of the teacher, the teacher's own life must be so organized that his personality will grow with increasing years. His life must expand in terms of adult values if he is to lead children in the direction of adulthood. In order to determine whether his life is properly oriented, the teacher may well compare it with certain criteria for his own self-evaluation.

Socialization. Maintenance of emotional and social viewpoints on the adult level necessitates abundant contacts with adults. If the teacher fully appreciates the fact that his real competition in life is on a plane higher than that of childhood, his emotional poise is stabilized. Knowledge of people in the community and of the social and economic problems that they face often contributes to an understanding of classroom problems. A teacher's attitudes toward life are also liberalized through travel, extensive general reading, hobbies, and participation in community activities. The gain through socialization is derived from influences that keep one's life interests from becoming unduly centered within the walls of the classroom and thus becoming detached from other important realities in life.

Professional Improvement. Teaching should be regarded as more than dealing with the same instructional materials from year to year in much the same manner. New facts and applications of facts as well as improved techniques of presentation constantly make their appearance. Failure to keep abreast of one's subject-matter field is the usual basis for the boredom of "teaching the same things year after year." The teacher must be interested in the materials taught and in the art of teaching before pupils can be expected to be stimulated by the teacher's guidance of their learning. Teachers may well follow the example of successful physicians, lawyers, ministers, and members

of other professions, who are so interested in their respective fields that they seek opportunity for self-improvement by attendance at professional meetings, advanced study at a college or university, professional reading, hobbies, or personal research. The teacher who is receptive to opportunities for becoming a better teacher possesses emotional qualities that enter into all aspects of instruction. His example encourages his pupils to emulate his efforts for self-improvement.

Self-study. Successful teachers study themselves objectively and are interested in discovering defects in their methods of dealing with others. They are conscious of their imperfections as individuals. They are interested in adequate means for solving personal problems and have successfully solved many such problems.

Examination of personality tests and adjustment inventories reveals details of behavior that are characteristic of desirable and undesirable tendencies. Without actually taking such tests, one may thus discover a profitable basis for self-evaluation. It is helpful to consider the manner in which one accepts failure, responds to criticism, adjusts himself to social activities, or is tolerant of others. Teachers who are interested in becoming stimulating individuals frequently reflect upon the impression they make upon people. They may often discover in themselves the faults that they are most inclined to notice in others. They may, for example, reprimand children for restlessness and themselves be lacking in calmness and poise.

Interest in Children. Learning to understand children is always preferable to judging them dictatorially and arbitrarily imposing adult standards. Teachers must be interested in children and wish to discover their characteristics as individuals. They are essentially human engineers. An objective point of view is desirable, midway between the extremes of sentimentalism and "hard-boiled" aloofness. The teacher who comes to know children will allow them to express themselves *as children,* permit them to be children, and appraise their behavior in the light of

flexible standards of value. Relationships with children should inspire trust and confidence.

The principles of mental health, if cultivated and practiced in the classroom, will substantially contribute to the wholesome personal development of children. Through observation and study, pupil differences in ability and personality will take on new meaning as sympathy with them as individuals increases. Likable traits will be discovered, and there will be increasingly less prejudice because of race, social status, or intelligence. Effort spent in trying to understand children becomes apparent and is appreciated by children. If a teacher tries to understand them, his pupils are inclined to evaluate him more fairly. An understanding of children is especially significant since the source of many emotional tensions in the classroom may be found in lack of satisfactory rapport between teacher and pupil.

Personal Health. Teaching is an occupation at which even minor impairment of health is almost immediately reflected in the performance of one's duties. At many occupations lack of maximum efficiency affects objective output, but in the classroom the emotional states accompanying poor health are readily transferred to pupils who respond in the form of inferior work, indifference, or irritability. The teacher's health, therefore, should be carefully conserved in order that a reserve of energy may be accumulated for unexpected situations. Proper food, rest, recreation, and sleep are obviously of basic importance. The teacher's physical health is particularly susceptible to emotional influences. Lack of mental health may lead to physical disturbances in much the same way that poor physical condition may cloud the mental outlook. The teacher may well set as a goal of health a condition such that each day's work may be begun with the feeling that he has more than adequate force and vitality to release into his work. Pupils are attracted by radiant health, since it suggests to them a dependable source of power and strength. Under such conditions, the total day's work is made easier and more interesting for teacher and pupil alike.

PROBLEMS FOR DISCUSSION

1. Reconcile the statement that children are not born bad with the frequent observation that undesirable behavior appears among all children in some families and not in others.
2. On the basis that behavior is essentially adjustment to satisfy personal purposes and demands made by others, outline appropriate adult attitudes toward behavior problems of children.
3. Evaluate the assumption that the home is the perfect or ideal place for rearing children. Characterize various types of home as sources of emotional problems.
4. As a teacher, outline procedures for helping a pupil adjust to a new school or new neighborhood environment.
5. Describe some of the critical periods of emotional adjustment through which children pass before achieving adulthood. Why is chronological age an unreliable index of emotional maturity?
6. Compare the emotional influence of different kinds of teacher —dictatorial, sentimental, indifferent, and intellectually zealous—upon pupils that you have known or upon yourself.
7. Outline various disciplinary problems that you have observed in school and analyze them as symptoms of (*a*) chronic emotional distress, (*b*) conflict with inflexibility of the school program, (*c*) developmental difficulty, or (*d*) lack of intellectual stimulation, particularly at extremes of mental ability.
8. Describe experiences in which behavior problems have been precipitated by an immediate incident but upon analysis have proved symptomatic of one or more remote adjustment difficulties.
9. Narrate experiences that you have had with children whose behavior in your presence has revealed (*a*) rationalization, (*b*) overcompensation, or (*c*) other behavior mechanisms recognized as such.

10. Suggest potential conflicts resulting from adult domination of society which constantly encourage juvenile delinquency.
11. Some educators recommend complete case studies of every pupil. Suggest outcomes that may be desirable and undesirable from the standpoint of (*a*) pupil, (*b*) teacher, (*c*) school administrator, and (*d*) parents.
12. Outline a basis upon which an administrator may unostensibly (*a*) appraise a teacher's mental health and (*b*) eliminate causes of many undesirable symptoms. What is a desirable attitude to be held toward a teacher found emotionally unsuited to his work?

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Part II

Directing Learning

CHAPTER VI

Preparing Materials for Learning

Although it is possible for a teacher to begin a course of instruction with no definite plans or purposes in readiness most of us agree that such a practice is hazardous to good learning. Such lack of planning may be interpreted as evidence that the teacher is unaware of the full significance of learning material. He may not be conscious of any particular goals to be sought beyond that of establishing the ability to recall or recognize during recitation and testing.

Organization of Learning Material

If the possibilities of instruction are examined, it will be seen that, unless a teacher makes definite plans in advance for the use of learning material, the quality of instruction may suffer from lack of consistency or be inadequate and narrow. Guidance of mental growth demands that the teacher appropriately organize his learning materials in advance. Doing so by trial and error methods after instruction has begun often results in poor and ineffective presentation.

Purposes of Organization

be used to foster learning. The relationship between the pupil and the materials of learning constitutes a psychological situation. The effect of learning material upon the pupil depends upon many factors. Since each pupil possesses a different background of experience and training, identically organized material will have varying effects. There should be no confusion concerning the nature of the pupil's activities while he is learning. A pupil does not learn the facts on the printed page in the sense that he simply stores them away for future use. Instead he performs numerous mental activities that the material suggests.

A teacher may greatly influence the type of learning by the principles that he emphasizes in selecting and organizing materials. He may stress the important principle of relating materials to pupil experiences. He may, for example, revive a pupil's recollection of damage done to an automobile engine by freezing and thus clarify the effect of low temperature upon a given volume of water. He may ask pupils to suggest other situations in which the expansive force of ice may have been observed.

The process of learning is one of continuous organization and reorganization of experience. It is more than memorization. Hence, organization of materials should be made on the basis of the learning process and the results that are sought. Reproduction of learning material from memory is only one kind of response. The learner makes various other types of response when he develops new meanings as a result of his continued study.

When a child receives instruction that results in the ability to add $2 + 3 + 4$, obtaining 9 as their sum, more is involved in his learning than mastery of a single specific operation, applied to three particular numbers. He is not encouraged to learn this exercise as a specific fact. The purpose of his practice, which will be applied to other combinations of numbers, is essentially

to develop response patterns which will be useful later in more complex situations.

By performing exercises of similar nature, he becomes aware of certain recurring truths. Each number gradually acquires meaning as a generalization of quantity, and the arithmetical relationship between the numbers is found equally valid whether one is computing a sum of people or blocks of wood. The child also will learn that he must obtain the sum of two of the numbers before dealing with the third. Although the nature of these recurring concepts is not explicit in any of his exercises in simple addition, they nevertheless develop during a succession of increasingly complex exercises as important end products of practice.

During the learning process, given types of organization are constantly subject to reorganization. During the process, learned procedures must frequently be adapted to slightly changed situations. While the child continues the study of arithmetic, he will discover a similar though differently applied principle as he practices adding more than three numbers. Learning materials must be so arranged that they will facilitate organization and reorganization of experience.

A pupil's organized background of learning experiences plays an essential role in lending meaning to the statement, for example, that water boils at 212°F. The pupil must perceive many relationships before the statement is intelligible. He must understand the properties of a substance that permit it to boil. He must have some conception of the action of boiling. From his experience, he must apply interpretation to 212°F., deciding whether this symbol of temperature suggests heat or cold. Unless throughout his learning experiences he has developed an organized background of information, he will encounter many facts to which he can attach no meaning. If his background of facts were an unorganized accumulation, the problems he would face in making use of his knowledge would be overwhelming.

A purpose of organizing learning material is to provide an orderly background of experience, which facilitates understanding of new situations and increases the efficiency of learning.

Organizing Materials Adequately

Since there are the experiences of the pupil on the one hand and systematized knowledge on the other, the organization of learning materials must be related to two major points of reference. Organization from the standpoint of meaning to the learner may be characterized by the term "lifelike." It is commonly called the "psychological approach," since it is most closely geared to the learner's capacity to understand. From this point of view, the structure of organization is in conformity with the increasingly complex experiences of the learner. On such a basis, many activities of the classroom may begin with "concrete" experiences of the learner and lead to generalizations closely related to his needs and interests. As his experience and knowledge in life situations multiply, they may be applied in the activities of the classroom. He will engage in various projects to explore the possibilities of his surroundings for the purpose of increasing the breadth of his experiences.

In basing organization of learning materials upon the child's world of experiences, an important result is increase of motivation to learn. Visits to local manufacturing plants, observation of the operations of city and town government, or investigations of outdoor life in the vicinity afford interesting experiences, extend his range of information, and stimulate his effort to acquire knowledge. Pupils respond more productively to a program of "doing" than to one of "listening."

In the "lifelike" program, emphasis is also placed upon learning activities that are socially useful or apply in daily living. Effort is commonly made in arithmetic, for instance, to include problems that are realistic. In real life all persons learn in their own way to interpret their experiences, solve daily problems, and learn from contacts with the world. To many it seems unrealistic

to cram children with information that may not satisfy their actual requirements. Such learning is not the way of the world. Children as well as adults should discover facts by constant spontaneous exploration and by search for information as it is needed.

Although learning materials acquire meaning when a pupil can relate them to personal experiences, organization exclusively upon such a basis is inadequate. Advocates of "lifelike" activities assume that items of information gathered as they impinge upon a pupil's interests and experiences require little external stimulation in order to result in an organized body of knowledge. Actually, such organization may be restricted in scope to the common elements of random activities. Such an approach may result in futile and uneconomical effort, and learning may be fragmentary and lack sustaining framework. There may be a high degree of trial and error in obtaining desired results. A child's experiences are by no means representative of those of a mature person. In our complex civilization we should not expect his incidental experiences to suggest spontaneously or adequately his future needs. The child is scarcely competent to be the sole judge of the significance of learning materials.

The other approach to organization of learning materials is to establish systematic arrangement of knowledge on a logical basis and to establish the relationships inherent in knowledge. Essentially, such organization is an attempt to classify information. A broad major field, such as mathematics, may be broken down into such restricted fields as geometry, arithmetic, or algebra. Each of these fields, in turn, may be broken down further by grouping materials in which types of operation are similar.

When logical arrangement is applied to materials to be used for learning purposes, care is usually taken to limit their maximum difficulty as well as to organize a sequence of difficulty in understanding. Beginning with certain fundamental concepts and principles, materials are developed with increasing complexity and operational difficulty throughout a subject.

In this form the presentation is encyclopedic and not planned

to best advantage for an inexperienced learner. For the immature learner, it may be an unsatisfactory basis for presenting learning material and for suggesting the types of response necessary to good learning. For the mature specialist who is familiar with a field, however, logical presentation may be effective as an aid in bringing scattered details into focus in an organized field.

Organization on the basis of relationships within subject matter may include much material that is foreign to a pupil's experience. Since material is presented before he is ready for it, logical arrangement favors a single type of response, namely, mastering the content with an aim to reproduce or recall it. Until a pupil's background of experiences can lend meaning to materials, he cannot respond in any other manner. Although items of information may be located so that their context yields meaning, the plan of organization may make excessive demands of a learner and be inadequate.

An adequate plan of organization may be established to include many desirable characteristics of the psychological and the logical approach. Such a plan provides a meaningful succession of topics throughout a course of instruction and makes continual reference to a pupil's experience and background. Such organization will also unite the pupil's experiences with systematized knowledge.

During the elementary-school years, a pupil's range of experiences is largely in concrete terms. He is more familiar with his local surroundings than with faraway places. His immediate present is more significant than the past or future. As we seek to establish contacts with the child's world and provide landmarks for him at appropriate points in the subject matter, a plan for organizing materials becomes especially significant. If it is necessary to pause at given points during a logical unfolding of material in order to bring them within the range of a pupil's comprehension, it is still possible to return to the "main highway" without losing sight of the general direction.

As individuals mature, their learning becomes increasingly enriched by ability to generalize, think abstractly, and draw upon their background of experiences. The way in which a pupil matures is described by Buswell [1] as follows:

> Any person can identify this developing process in any interest which has developed to a mature stage. Any boy's interest in model airplanes illustrates it equally well. At first he simply wants a plane that will fly. Then he wants it to fly faster and longer. Then, through comparing (relating) the flight of his plane to that of those of his friends, he wants to know how to improve the flight of his own. His interest now veers to the scientific; he wants some general knowledge, some principles that will direct him. Gradually, he comes to be interested in technical aspects of aerodynamics and spends hours in reading "abstract" material that provides a systematic and organized framework for his problem. His interest now is habitual and the time he devotes to "concrete" flying of a plane is far less than the time he willingly gives to furthering his abstract understanding of aviation.

Mature pupils can assimilate larger amounts of information on given topics. In presenting learning material to them, it is less necessary to digress among concrete experiences. Scholars as well as many bright students display ability to benefit by the organization inherent in subject matter and ability to draw effectively upon their backgrounds of experience and make their own plan of organization. But for typical learners flexible organization planned in advance is always necessary in order that topics at various points of a logical system may be reached by lateral branches originating within a learner's experiences. In orienting him in his learning effort, we must begin with what is familiar to him.

Proper organization makes for flexibility rather than rigidity of control in directing learning experiences. Although a guiding pattern may suggest fixed routine, it actually makes digression

[1] BUSWELL, G. L., "Curriculum Organization and Sequence," Chap. XIII in *N.S.S.E. 41st Yearbook*, 1942, Part II, *The Psychology of Learning*, p. 455.

for full explanation and discussion less hazardous. We may conceive of organization as the establishment of a well-marked highway. From this main highway extend trails on either hand which reach the backgrounds of experience and knowledge of individual pupils.

The plan of organization should encourage the pupil to make practical applications. Many teachers accept the arrangement of materials in a textbook as the basis of a plan and may be confused by the suggestion that supplementary organization is desirable. By constructing a plan, the teacher is anticipating the ways in which the best possible uses may be made of all available learning materials including the textbook.

Many teachers construct a schedule and designate units of work for completion during specified periods of time. They decide upon desired types of pupil response to learning materials and plan devices for stimulating such responses. They consider the extent to which supplementary materials are available for use as the various units of topical matter are reached. They investigate the typical experiences and interests of children as well as those of children in the particular community. They may survey possibilities for projects, field trips, local materials for study, and other opportunities for application or illustration. The teacher may discover activities of special interest to individual pupils. A plan of organization is constructed in advance of a course of instruction in order to adapt learning materials to local and individual requirements, to plan the ways in which teaching may be effective, and to increase the meaningfulness of material.

Principle of Continuity

When learning materials are properly organized, a principle of continuity is implied. Since an important aim of organization is to improve the quality of meaning that the learning task may stimulate, learning experiences should begin with the *known* and progress toward the *unknown*. When due recognition is given

the learner, there should be, in passing from one unit of learning material to another, no "built-in plateaus" to confuse the learner.

An important means of maintaining continuity is provision for an over-all view of the learning materials before detailed facts are studied. Guidance given a learner in this manner is analogous to the orientation of an individual in a strange city by designating important streets and large buildings as landmarks. By first viewing learning materials in their totality the learner may not understand the topic so fully as he will later, but he will have a framework for organizing his knowledge. The principle is that *wholes* are used as means of clarifying the meaning of *parts*. It is important to provide frequent glimpses of learning material in its entirety as well as to deal analytically with detailed items of information. In a sequential arrangement of learning materials, pupils are given frequent opportunity to develop insight into their tasks as wholes in order that isolated facts may reveal new meanings.

Readiness for Learning

Placement of learning materials at proper levels of pupil maturity is significant among the problems of organization. Many difficulties which must be solved are directly related to the selection of subject matter of appropriate difficulty and value for children of various educational levels. Intelligence and achievement tests, interest inventories, and subject-readiness tests have been used to analyze pupil potentialities and differences at successive age and grade levels. Although the teacher is seldom concerned with technical aspects of curriculum building, certain of his problems are similar. He finds it necessary to obtain similar kinds of evidence when evaluating the maturity of learners and preparing materials for their use.

Pupils react to learning materials to best advantage when they can interpret them readily, endow them with meaning, and find in them a contribution to their personal interests and needs. Curriculum builders apply this general criterion when apprais-

ing the readiness of pupils and the appropriateness of materials. Placement of subject matter at inappropriate maturity levels may result in the use of material that is too difficult or too easy.

Backgrounds of pupil experience are revealed by surveys of information, skills, and interests. Standardized achievement tests that survey educational background as well as proficiency in subject matter such as reading, arithmetic, natural and social sciences, and literature are often administered. "Background" tests are usually restricted to specific fields in order to supplement general achievement tests. Such a test may be used, for example, to evaluate a pupil's readiness for a course in science. Tests of the prognostic type are generally used to determine whether a majority of pupils in courses such as foreign languages or mathematics are likely to achieve success. The evidence derived is often of additional value in determining the educational level for which a given course is most appropriate. Since they reveal the present state of knowledge, skills, and degree of intellectual maturity, they are valuable to textbook authors and curriculum builders in planning materials to accord with age and grade level.

The readiness of a learner is frequently determined by surveys of his abilities to comprehend and define words and objects. Effort is made to evaluate his comprehension of everyday objects and symbols, and also his ability to recognize and define concepts in special fields such as mathematics and natural sciences. In one survey an investigator calculated the percentage of pupils in Grades IV to XII who were familiar with such concepts as *mixed numbers, altitude,* and *dividend.* It is not uncommon in such surveys to discover that a single concept may be defined by pupils distributed throughout five or six grades. Hence the results are used as points of reference rather than as standards.

An important approach to readiness has been that of compiling words commonly known by pupils at various age and grade levels and constructing *word lists.* Such lists are extensively

used to determine the difficulty and appropriateness of vocabulary in elementary- and secondary-school textbooks. These word lists should be interpreted cautiously because ability to comprehend detached words may not always be a valid index of ability to understand statements in which such words appear.

Interests of pupils often suggest their readiness for learning. Through the use of information concerning the activities that they prefer, insight may be gained concerning the nature and range of interests possessed by children of various age and grade groups. Pupils may be expected to possess some degree of familiarity with experiences that their interests involve, and knowledge already possessed may be used as an aid in introducing materials that are less familiar.

The motivating force of a pupil's interests must be considered by those who prepare learning materials. If a pupil is working at a learning task involving an activity in which he is interested, he will typically display greater initiative and resourcefulness in solving difficulties than in the case of material that has limited personal value. Teachers use this principle widely in providing supplementary materials related to the interests of particular individuals. A flexible organization permits variation in learning materials to conform with pupil interests without deviation from important purposes of a course.

It is necessary in preparing learning material to take into account varying pupil capacity to learn. Knowledge of the intelligence of children as they advance from one age level to another is useful in predicting a pupil's success in mastering various types of subject matter. The type of intelligence test that differentiates various aspects of mental ability has been especially helpful in determining growth in an individual's different reactions to verbal materials. The more closely test materials correspond to mental processes and activities involved in actual learning situations, the greater their predictive value.

The age at which a child should begin reading involves physiological and psychological readiness as well as necessary back-

ground. The fields of arithmetic and reading have been intensively studied with reference to the degree of readiness that children should possess. Many tests have been developed in which the child's state of readiness may be measured. The aims of constructing such tests have been to determine not only when pupils should begin such subjects as arithmetic or reading but for which elementary-school grades they are ready in other standard school subjects.

Research findings dealing with the problem of readiness are especially significant to a teacher. Frequently he will wish to keep abreast of current research by studying the literature applicable to his teaching field. In some cases he will administer tests and conduct investigations in his own classroom. During his experiences in working with pupils, he can observe the appropriateness of materials for his own pupil group.

The Textbook

In a majority of schools the textbook constitutes the most important single source of learning material. In many classrooms it not only provides the content of courses but actually determines the method of teaching. In large school systems, courses of study developed by experts often serve as guides for learning material, but even in such cases textbooks often dominate the instructional scene. The textbook is almost universally the crucial point between the pupil and his learning material.

Construction of textbooks for elementary and secondary schools in the light of scientific information regarding growth and learning of pupils is becoming a significant development in education. Authors and publishers have been increasingly interested not only in providing accurate information but in adapting materials of learning to the maturity levels of the learner. Such adaptation has involved search for the best knowledge related to the concepts that pupils of various ages and grades possess, to the activities that interest them, and to their educational background and attainment. Outstanding improvement has been made in

graphic and pictorial presentation in the interest of making books attractive and understandable.

The Teacher's Knowledge of Textbooks

Professional courses may not provide training in construction and evaluation of textbooks for use in elementary and secondary schools. Many teachers learn for the first time while actually on the job both the content and method of the subjects taught. It is difficult for members of the teaching profession to keep fully informed of trends in the applied psychology of the curriculum in order to make judicious selection of textbooks. Teachers have little opportunity to become acquainted with research knowledge used in constructing and evaluating textbooks. In a recent study,[2] elementary-school teachers were requested to answer questions such as: *Define a word list. Is a word list a guarantee of reading ease or difficulty? Define a point of type.* Only 40 per cent of the replies were correct on the basis of scientific information.

Understanding the function of word lists is essential to an objective analysis of textbooks. The vocabulary of most standard readers in the elementary grades is based on one or more such lists. Only half of the teachers whose familiarity with textbooks was studied could define a word list. Fewer than half could name one or more such lists. Although a word list is one of the most objective measures of the appropriateness of reading material, checking the vocabulary of a book against a recognized list does not ensure that the reading will be suitable for the typical child in grades for which the book is intended. Other factors include sentence structure, parts of speech, paragraph construction, concepts portrayed by the vocabulary, and the number of concepts presented per page. More than half of these teachers did not believe that checking against word lists would assure reading appropriateness, but only 40 per cent named other factors of importance.

[2] UNDERWOOD, W., Analysis of Textbooks, unpublished study, University of Colorado, 1941.

As a criterion for selecting textbooks, size of type was cited more frequently than any other single characteristic. About half of the teachers preferred the type commonly used whereas 37 per cent preferred larger type. According to scientific investigation, the use of type smaller than that customarily used in elementary books results in increased reading speed and comprehension.

Teachers in general judged a textbook by attractiveness and physical construction—for the most part, qualities that easily command attention. They considered less frequently more important criteria such as organization of material, appropriateness for grade and ability levels, and effectiveness for motivation.

Criteria for Selecting Textbooks

In some school systems committees of teachers formulate criteria for making detailed analyses of books considered for adoption. Such criteria include certain general qualities under which are listed various specific factors to be considered in making a detailed analysis. The following abridged criteria are some that have been considered significant:

I. Authorship
   1. Experience
   2. Authority
   3. Participation in scientific investigation

II. Content and organization
   1. In harmony with educational aims
   2. Teachable organization
   3. Modern character of situations
   4. Material suited to age
   5. Balance of content

III. Vocabulary and readability
   1. Controlled vocabulary
   2. Concepts on level of child
   3. Style clear and lucid

IV. Method and motivation
    1. Interesting material
    2. Emphasis on thinking, creative work
    3. Well illustrated
V. Teaching and study aids
    1. Reviews (simple and cumulative)
    2. Tests to accompany book
    3. Questions, exercises, and drills
VI. Mechanical make-up
    1. Print
    2. Spacing of words and letters
    3. Bindings
VII. Miscellaneous
    1. Copyright date
    2. Student opinions
    3. Publisher

In developing score cards that permit each examiner to apply selected criteria conveniently, the problem arises of the extent to which one should break down major divisions into small items. If the criteria are not in sufficient detail, the score card is subjective and inaccurate. If major divisions include too many items, overlapping results, with excessive emphasis upon details and inadequate stress upon major considerations. In general, a score card should be sufficiently analytic to ensure objectivity and accuracy but be no more detailed than necessary.

Weightings are usually assigned to various items on the basis of importance in local school situations. For example, one of the criteria may be the extent to which a textbook coincides with a course of study. When a course of study is organized without regard to a textbook, the textbook often influences teaching more than the course of study. In cases in which a course of study must be followed closely, it is important to determine whether the textbook is consistent with it. On the other hand, if the school prescribes no course of study or if the course of study is

merely suggestive, the book may be analyzed on other bases. Formal scoring is unnecessary if a teacher uses the score card only as an informal check on the features that should not be overlooked in analyzing a textbook.

Extensive versus Intensive Reading

In some subjects, of which social science is a good example, it is common practice to require pupils to read from many different sources. One assumption may be that the greater the number and variety of ideas with which pupils come into contact, the greater the assurance of good learning. The increased number of textbooks and special sources of information perhaps also suggests that each generation of pupils should master ever-increasing amounts of material. In any case, many schools and colleges still insist upon an incredible amount of reading in courses in which reading plays a leading role.

The problem invites brief reference to the effectiveness of extensive and intensive reading. What are the relative advantages to the pupil of organizing a course on the basis of large and small amounts of reading? If supplementary materials are suggested for voluntary reading, many individuals discover among them topics of individual interest, which may motivate special effort. Specific assignment of excessive amounts of reading, however, may result in the characteristic disadvantages of a crowded curriculum. The problem is often one of time in which to cover extensive assignments with proper emphasis upon mastery of significant facts and reflection upon their meaning. With limited time, pupils are obliged to spread their effort somewhat thinly over extensive reading assignments. Extensive reading may be recommended, however, if the teacher's purpose is to encourage general familiarity with viewpoints of other writers or to present a more adequate treatment of certain obscure topics.

Pupils cannot solve problems and think reflectively without an adequate background of information. But this information must be interpreted if it is to contribute to orderly thinking. If

wide reading consists of cursory examination of material without intelligent responses, the practice cannot be justified. Much superficial learning may result as well as inadequate guidance in organizing large quantities of diversified material. A few well-chosen references to material that needs to be thoroughly studied are to be preferred to numerous references which may result merely in accumulation of unassimilated material.

Planning Courses

The teacher should regard the planning of learning materials as a continuous activity in which he maintains the attitude of experimentalist, selecting various materials in the light of his best judgment, noting the success resulting from their use, and revising plans in accordance with the results of experience. In most cases when he uses a textbook, it will be supported by a carefully planned background of supplementary material.

The procedure involved in planning materials will consist of two important steps. The first is to examine available sources of learning material, including textbooks and supplementary books of various kinds. For the teacher's personal use, books dealing with the psychology of learning and teaching his subject are helpful. On the basis of the best available sources he will choose appropriate activities for the particular age and grade level to be taught and for the length of time at his disposal. For example, the elementary-school teacher may decide that it will or will not be possible to teach his particular group effectively during a single semester such fundamental operations as addition, subtraction, multiplication, and division.

After the selection of learning materials, the second step is to consider their organization so that it will be possible not only to deal with certain topics in sequential arrangement but to gauge progress as learning proceeds. In the elementary school a textbook may constitute the principal if not the sole guide. The teacher may follow each step as outlined by its author. His plan for teaching will include exercises to be performed by pupils,

amount of practice needed, provision for pupil differences, types of test, and the use to be made of test results. The textbook supplies significant materials to be taught and serves as a guide from one stage of progress to another.

In the secondary school, this step frequently involves building a syllabus. Such a course outline should indicate the major topics or units to be covered and give appropriate references to sections in the basic textbook. It should also provide references to sources of information other than the textbook, problems to stimulate thinking, or questions for discussion. The outline of the course should seek to focus learning activity upon attainment of definite objectives. In reading subjects, the development of a syllabus serves many useful purposes among which is the unification of materials and the encouragement of the learner to study against a background of recurring concepts and meanings.

It is desirable to present the materials in such a way that the learner knows where he is going and how to get there at every stage of progress through a course of instruction. Planning a course in such a manner does not imply that one can or should follow an inflexible outline. There will frequently be need for digression in order to provide for pupil interests and needs. But having a plan is the only way in which the teacher can be certain that pupil needs and interests will be recognized without neglect of effort toward attainment of definite aims.

Building Units

In organizing materials for courses, we often think in terms of units of material or units of work, indicating that there are closely knit bodies of subject matter that are capable of standing alone meaningfully. Each unit of subject matter, however, should be related to every other unit in such a way that each constitutes a significant part in the larger whole represented by the course itself. Organization of materials into units enables the learner to progress through a course of instruction by definite stages, to take stock of progress at the completion of each unit, and to

benefit by supplementary instruction suggested by analysis of test results.

In the elementary school the development of units frequently means the planning of projects or socialized activities centered about a basic theme such, for example, as *transportation* or *communication.* Whenever possible, the pupils themselves should be encouraged to be responsible for collecting and organizing the materials. Cooperation by members of the class makes possible socialized procedures in teaching. There are various criteria for the development of units as used in this sense. They have, however, certain provisions in common: (1) There is effort to select subjects or topics that are interesting and within the experiences of most of the members of a class. Frequently the pupils themselves cooperate in selecting the subject and the means for its development. (2) There is opportunity to deal intensively with the various aspects of the subject. (3) There is emphasis upon doing something such as collecting certain items of information, working on a problem, making a report in class, or participating in class discussion. (4) Effort is made to arrive at a conclusion or to solve a problem. Pupils have the satisfaction of feeling that they have accomplished their purposes.

Unit in the case of the high-school pupil often means a major topic or subject. In physics, for example, there may be a unit on mechanics, another on heat, and still another on electricity. In United States history there may be a unit on the War of 1812 and another on the Civil War. Organization of material into comprehensive units is characteristic of learning on high levels of scholastic maturity. Units should be large and significant enough to ensure the development of fairly complete ideas and formation of generalizations. For this reason, the larger the unit within limits, the better. A few large units imply effective organization; excessively small units, poor organization.

Units, in the case of mature students, often include activities of an abstract nature. Recurrent principles are usually found in the form of generalizations. By contrast, in the case of young

children units tend to stress concrete, lifelike materials. The difference is a matter of degree rather than kind. All learning materials should stimulate the learner to make an active response.

PROBLEMS FOR DISCUSSION

1. Present arguments for and against the practice of preparing in advance a plan for presenting learning materials.
2. How is it possible to prepare learning materials in advance and at the same time provide for differences in learners?
3. Describe how full adherence to logical or psychological plans of organization would affect the teachability of a subject in which you may be interested. In what modified forms would you accept these plans of organization?
4. Compare the appropriateness of logical and psychological organization for learners of different educational levels.
5. Discuss the nature of the learning process as the fundamental guide for the effective presentation of learning materials.
6. Account for the difficulty which many writers of textbooks experience in planning the organization of material. Why does checking textual material against standard word lists inadequately solve the problem of appropriate organization? Clarify your explanation by referring to a subject with which you are familiar.
7. Select a textbook and analyze it with reference to standard criteria used in evaluating textbooks.
8. Evaluate the practice of relying upon the organization of a textbook to direct learning.
9. Discuss the point of view that psychology should aid in determining not only *how* to teach but also *what* to teach.
10. Evaluate the use of large amounts of learning material from which only the most significant information is gleaned as compared with study of small amounts of material by means of which fundamental principles may be intensively stressed.

11. Compare large and small units of learning material with respect to the mental organization that their use stimulates.
12. Build a unit for a course that you are now teaching or planning to teach.

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CHAPTER VII

Cultivating Abilities

A child's earliest learning effort is that of becoming oriented in the physical world. Little by little his ability to recognize objects and persons about him increases. Through use of spoken words he is soon able to give names to various aspects of his surroundings. The next stage in his mental development involves discovery that curiously drawn figures are somehow associated with spoken words, and ability to read such symbolic language begins to develop. He learns that written words reach out to bring in to him much that may not be physically explored or visited.

During his early years, his learning consists to a large extent in acquiring knowledge involving the identification of his world in terms of words. The ability to understand simple concrete facts is soon shared with the ability to use words for meanings that have little physical reference. The child learns to generalize. He develops ability to apply ideas derived from one situation to different situations.

His world is now twofold. In addition to that part which may be verified physically, there is a part that is intangible and must be dealt with abstractly. Thus his learning is concerned with

concrete materials and objects and with principles involved in the ability to think in a highly complex fashion.

We are concerned with instruction that cultivates such learning in its fullest sense. In such a sense we recognize that mental development possesses both simple and complex aspects and that the aims of instruction should be sufficiently broad to afford opportunity for maximum development.

Instructional Aims and Mental Growth

Intellectual growth includes mental change that is far broader than simple accumulation of information presented by formal learning material. Constant organization and reorganization of experience occur. Facts possessing similar meanings are generalized, and the generalizations thus formed serve as clues to the discovery of meaning in subsequent problem situations. One of the first early concepts to emerge is that of number. Here the child discovers that the same mathematical principle is followed whether he is seeking to determine the sum of 2 eggs and 3 eggs or of 2 books and 3 books. Henceforth he recognizes immediately that 2 objects of a given kind may be added to 3 objects of the same kind, and the result—5 objects—is always obtained.

The process of mental growth suggests appropriate uses that should be made of learning materials. Since this process involves more than accumulation of information, the teacher who merely dispenses factual materials according to the learner's apparent capacity to memorize does not fully recognize his responsibility for the guidance of mental growth. He recognizes such responsibility when learning materials are used in developing abilities focused upon the organization and reorganization of experience. Optimum growth in all aspects of mental development may be expected only when learning materials are purposefully used. Setting the stage for learning thus implies that we thoughtfully select materials and plan activities involving their use in an effort to foster mental growth in its fullest sense.

Learning materials and activities should be so presented that they will require pupil responses representative of practice in the types of ability selected for cultivation. Definite formulation of instructional aims is therefore essential. Otherwise, pupil accomplishment is likely to be restricted to mastery through memorization. The child will merely observe and record certain specific facts but without proper guidance will not necessarily attain much mental growth as a result of accumulating such information. Other aspects of intellectual development may be left largely to chance or incidental experience.

Uniqueness of Abilities

A child's organization and reorganization of his experiences result in numerous types of ability. Many such abilities involve different kinds of mental activity. When a child is attempting to apply a given principle in solving a certain problem, different mental processes are in operation from those which are involved when he is seeking to discover a common truth among an array of unfamiliar facts. It is possible to identify and isolate to some extent certain abilities as essentially unique, and to regard them as distinct goals to be sought through instruction.

A given ability may be cultivated more effectively by one type of subject matter than by another. We may expect, for example, a course in general science to favor certain abilities which may not be greatly favored by a course in dramatics. Social studies are frequently associated with formation of social attitudes.[1] English may contribute toward increased skill and comprehension in reading. It may also help the pupil develop appreciation for reading materials of good quality and increase his ability to express himself fluently and accurately. Mathematics may extend beyond the acquisition of familiarity with numerous operational skills and include ability to analyze problems and formulate state-

[1] The cultivation of attitudes is recognized as an important objective of instruction in many subject-matter fields. The principles of their cultivation are similar to those which are applicable in the case of intellectual responses.

ments in mathematical terms. Every pupil properly instructed in mathematics should come into possession of a wide variety of accomplishments in the field.

Ability to obtain data leads to familiarity with reference material, library classifications, and sometimes sources of first-hand information. Ability to explain facts requires recall of pertinent information and evaluation of its possibilities. Techniques of study require discrimination between different types of facts and establishment of relationships between new and old meanings. Ability to derive meaning from a sentence in a foreign language stands somewhat above the memorization level of learning, which was instrumental during initial acquisition of foreign words and their specific meanings.

It is unfortunately possible, however, to satisfy the demands of many learning situations through the process of reviving memorized information. A pupil, for example, may memorize explanations that various situations require and prepare himself to recite them more or less verbatim.

Instruction, as a rule, is poorly directed with respect both to cultivation and to measurement of abilities. It is significant that when tests that are designed to measure higher abilities are used, pupils are found to have acquired abilities not purposely stressed during instruction. This finding does not mean, however, that instruction may depend upon chance influences for such development. Instead, it forcefully suggests that many types of mental development, which are normal results of growth, are too frequently not adequately aided by existing methods of instruction.

Attainment of ability on the memorization level is correlated only to a limited extent with higher abilities. Tyler [2] found that the coefficient of correlation between a test dealing with zoological information and a test specially designed to measure ability to perceive inferences to be +.29, which is insufficiently high to support the claim that an information test alone might have

[2] TYLER, R. W., Measuring the ability to infer, *Educ. Res. Bull.*, 1930, 9: 475-480.

been used to measure both abilities. In another study, Tyler [3] found the coefficient or correlation between understanding of technical terms and ability to draw inferences from facts only +.35, and between information and ability to apply principles only +.40.

In still another investigation by Tyler,[4] extending over a period of years, coefficients of correlation were obtained between scores on tests measuring factual information and scores on tests requiring both recall and application of principles. Corrected coefficients of correlation ranged from +.35 to +.54, a majority of them being close to +.45. Analysis of results indicated that many individuals developed superior ability in factual recall but were below average when recall and application were tested together.

Similarly, scores on tests requiring recall of information were correlated with scores on tests of ability to draw inferences from new data. Here the corrected coefficients of correlation ranged from +.27 to +.60, most of them being close to +.30. It was also found that 50 per cent of the individuals who were in the highest quarter of the class in recall were below average in ability to infer, and that approximately one-half of those who exceeded the average in recall fell below average on tests of inference.

The relatively low coefficients of correlation in these studies point to the conclusion that ability to make applications involves a mental process different from ability to recall, and that the two abilities should be tested separately if valid measurement is desired. The results of the studies further emphasize that there are different kinds and levels of learning, even in the case of the same material.

[3] TYLER, R. W., A generalized technique for constructing achievement tests, *Educ. Res. Bull.*, 1931, 10: 199-208.

[4] TYLER, R. W., "The Relation between Recall and Higher Mental Processes," pp. 6-17, Chap. II in C. H. Judd, *Education as Cultivation of the Higher Mental Processes*, The Macmillan Company, New York, 1936.

Cultivating Varied Types of Response

In order to provide opportunity through which pupils may develop types of ability beyond that of the memorization level, learning material must be appropriately organized and presented with definite goals. Desired aims seldom may be reached solely by apportionment of the factual content of textbooks and other material into units to be covered during fixed periods of time. Such material must not only be so divided but often rearranged or redistributed with reference to different types of presentation necessary in accordance with the varied types of response desired. A considerable amount of supplementary material is usually essential in order to develop various types of ability sought as instructional aims.

Textbooks frequently fail to afford opportunities for developing abilities through varied types of response. The principal purpose of a textbook is to organize learning materials into appropriate sequences. As a rule, textbooks provide adequately only for the learner who is encouraged to make responses indicative of his ability to recall or recognize facts. Even in the case of textbooks that seek to provide opportunities for practice involving complex types of mental activity, much loss in efficiency results from failure to distinguish between different types of response.

McCallister [5] summarized the content of 100 pages of each of 20 high-school textbooks in the natural sciences. The study was made to determine the relative emphasis given to (1) assimilation and retention of information, (2) apprehension of relationships, (3) development of concepts, and (4) solution of questions or problems (see Table IV).

Authors of high-school textbooks in McCallister's study were

[5] McCallister, J. M., "The Content of Secondary School Courses in the Natural Sciences as Revealed by an Analysis of Textbooks," pp. 106-134, Chap. VI in C. H. Judd, *Education as Cultivation of the Higher Mental Processes*, The Macmillan Company, New York, 1936.

concerned with presentation of factual subject matter to a much greater extent than with learning devices that might stimulate thinking on higher levels. The textbooks examined present the results of scientific inquiry but leave training in thinking dependent upon supplementary procedures to be devised by the teacher, incidental learning, or self-directed study.

TABLE IV.—SUMMARY OF EMPHASIS GIVEN TO FOUR TEACHING OBJECTIVES BASED UPON ANALYSIS OF TWENTY HIGH-SCHOOL TEXTBOOKS IN THE NATURAL SCIENCES *

	Assimilation and retention of information, per cent	Apprehension of relationships, per cent	Development of concepts, per cent	Solution of problems or questions, per cent
Four books with lowest emphasis on information.	45.5	11.3	21.4	21.8
Four books with highest emphasis on information.....	84.7	7.8	6.6	0.9
Average of all books.....	68.2	13.0	13.0	5.8

* Adapted from McCallister.

It is often necessary that the teacher make special provision for dealing with the factual content of a textbook so that its use may extend to higher levels of learning. Instructional objectives, which may contribute to mental growth, should be planned. Beyond factual mastery, the cultivation of two or three carefully chosen types of ability will ensure the kind of mental growth that is necessary for satisfactory learning. Our present state of knowledge of the nature of higher abilities does not warrant insistence upon particular types of higher ability in preference to others for emphasis in connection with subject matter. There

is abundant evidence, however, for insisting that learning materials should be used in a variety of ways. The abilities discussed below are typical of those which teachers may select.

Ability to Reproduce or Recall Learning Material

The foremost teaching objective has been to train the pupil to recall or reproduce information. In its extreme form, it amounts to rote memorization, which is essentially learning without comprehension. But on the other hand, evidences of ability to apply principles or to solve problems may often be analyzed and found to be simply previously learned situations, which may be recalled bodily in the same way as an isolated fact. In whatever form it is found, however, the ability to draw on memory has been the objective most frequently stressed in teaching and in testing.

This ability involves primarily the questions *who, what, when,* and *where,* or any other questions of fact or principle which on the basis of the best evidence available may be answered objectively. Analysis of test results based on various objectives indicates that mastery of factual information is positively, though in many cases not highly, related to other abilities based on identical learning material.

Information is obviously the raw material out of which knowledge and opinion are formed. As a basis of formulating other objectives, it is assumed that the pupil will have mastered the essential facts and principles of a given subject. Upon mastery and understanding of certain factual material depends the ability to solve problems, to apply principles, to draw inferences from given data, and to attain other types of teaching objective. Similarly, since principles themselves may be inductively developed on the basis of specific facts, acquisition of information is the foundation for any constructive goal of learning.

A pupil who knows the facts presented in a lesson is often unable to interpret data or apply principles based on such facts. The extent to which measurable teaching objectives are realized will depend to a large extent upon the efforts of the teacher and

his pupils to study facts in their various relationships. Factual information should be used with definite purpose as a means of furthering the development of other abilities.

Many students in high school and college are able to pass examinations and tests with high marks, and yet it has been repeatedly shown that they really understand little of what they are able to reproduce. Their principal concern in cases in which a premium is placed on ability to recall numerous specific items of information is to memorize for purposes of ready reproduction.

A majority of conventional tests, whether locally constructed or standardized, measure predominantly factual information. The responses demanded by such tests may be classified as (1) recall, or those types which cause the learner to reproduce previously learned material either with or without cues from the examiner, and (2) recognition, or those types which cause the learner to discriminate between various suggested answers provided. Testing devices that measure such recall include objective tests such as simple recall tests, short-answer tests, and forms of completion exercise. The essay test, which measures less objectively, also requires the pupil to reproduce and recall. Tests that require recognition responses include the multiple choice, true-false, matching exercise technique, and several variants of these.

Ability to Interpret Material

Ability to interpret material is being fostered whenever the learner is required to explain, interpret, or express in his own words the meaning of information. In certain fields a pupil may be asked to interpret relatively simple general statements. In other fields, such as social sciences, he may be called upon to discuss the significance of tabulated data, graphic display of facts, or current events. The pupil's interpretations constitute expressions of meaning and are in terms of other facts contained in his background of information.

The initial step in cultivating the ability to interpret data consists of the arrangement of groups of facts or of significant statements which will be presented to pupils for interpretation. Such material should normally be prepared in advance of instruction in this ability. Since the data to be explained may be developed by the teacher and not be contained in the textbook, numerous devices may be used for presenting the exercises, such as mimeographed copies, dictation, or blackboard presentations to be copied by the pupils.

The type of data to be presented to pupils for interpretation may be selected from materials of the instructional unit or from other sources of information. Some of the situations to be presented may be fully explained by the information that pupils have obtained during their study. Pupil responses may be sought not only to require use of their information but to test their discernment of its varying degrees of adequacy.

Situations for interpretation should introduce variety of material and present differing degrees of difficulty. Certain interpretations may be made by all members of a class, whereas others may be possible for only a few of its members. Pupils may be permitted to draw upon their own experiences or observations or to seek solutions in reference material. In dealing with responses requiring interpretation the amount of guidance is critical. When pupils cannot suggest an interpretation, the problem may be deferred for later consideration, and new situations presented which may be less difficult or better adapted to the degree of understanding that has been developed. Otherwise, pupils may not attempt to explain or interpret in hope that the teacher will make responses for them.

The guiding principle in constructing testing situations is that they should be of the same character as those in which pupils have had opportunity for practice, but sufficiently varied and different to stimulate original thinking at the time of the testing. Measurement of ability to recall or reproduce may use samples of the learning material studied. But attainment in ability to

interpret must not be so measured, since it can be demonstrated only if the ability is actually in operation during the testing.

It is important to observe a clear distinction between a memorized interpretation which the pupil may have learned from explanations given by the teacher or the textbook and an explanation that he constructs at the moment when his response is demanded. Prompting him with cues may defeat the purpose of testing in this ability, since the pupil may then respond in part on the memorization level. The use of problems previously explained would reveal the *results* of ability to interpret but not test the ability in *operation.* On the other hand, tests designed to measure the effect of training in the ability to interpret data are only of speculative value unless pupils have had opportunity for practice in typical situations.

In general, the test items should consist of display of situations followed by opportunities for responses of either recall or recognition type. The learner is required to make interpretations of the material presented. As during classroom instruction, the teacher may utilize statements, brief descriptions of circumstances to be explained, graphic presentations of facts, or tabulated material.

Table V is presented to suggest one of the many ways of presenting a situation requiring interpretative or explanatory responses.

In such a presentation it is necessary to direct the learner toward the desired responses in order to avoid aimless discussion. They may be asked direct questions, in the recall form, such as

1. How would you account for increased percentages for the year 1930 over 1870 in nearly all occupational groups?
2. Why do you or why do you not think that between the years 1870 and 1930 trade and transportation have shown greatest increase in employment furnished?

Recognition items may also be used and pupils required to indicate by use of numbers 1 to 5 whether the evidence makes

the given statements *true, partly true, uncertain, probably false,* or *false.* Such items may be used as

1. More people were engaged in farming in 1930 than in 1870.
2. In 1930 the percentage of gainfully occupied persons was greater than in 1880 for all occupations except agriculture.

As a means of measuring the extent to which the ability has been developed, the learner *must* use the data provided; otherwise, the test may be one of general information.

TABLE V.—PERCENTAGE DISTRIBUTION OF GAINFULLY EMPLOYED PERSONS IN THE UNITED STATES 16 YEARS OF AGE AND OVER, 1870 TO 1930 *

Occupational group	1870	1880	1890	1900	1910	1920	1930
Agriculture	52.8	48.1	41.2	35.9	30.3	25.8	21.3
Mining	1.5	1.6	1.2	2.1	2.6	2.7	2.0
Manufacturing	22.0	24.8	26.3	27.6	28.6	30.5	28.6
Trade and transportation	9.1	10.7	13.6	16.3	17.4	18.0	20.7
Clerical service	1.7	2.0	2.5	2.8	4.6	7.2	8.2
Domestic and personal service	9.6	8.8	9.7	10.0	10.6	8.8	11.3
Public service	0.6	0.7	0.9	1.0	1.1	1.6	1.4
Professional services	2.7	3.3	4.0	4.4	4.8	5.4	6.5

* Recent Social Trends, p. 284, as reported in Test 2.5, "Interpretation of Data," Progressive Education Association, Columbus, Ohio, 1938.

Recognition items are frequently used in experimental investigation of the effect of training upon the ability to interpret or explain. For classroom purposes, recall items can be used with equal effectiveness if they are so formulated as to require explanations.

Obviously, simpler situations must be provided for younger pupils and simpler responses required. In some cases in which a situation covers a limited range of meaning, the pupils may be required simply to restate or amplify it in their own words.

Ability to Apply Principles

The ability to apply principles is a part of a continuous development which begins during the first years of school and increases in complexity throughout the school years. It constitutes one of the crucial indicators of a pupil's understanding, and its cultivation involves a problem in transfer of training.

The ability is demonstrated when the pupil confronts an unfamiliar problem situation, decides what will happen or what the effect of a given principle will be, and gives evidence to validate his decision. An opportunity, for example, to apply a principle may be suggested by asking, "What will happen if a lighted match is placed in a jar containing carbon dioxide, and why?" A satisfactory response is "The flame will be extinguished, because combustion requires oxygen."

During the first years of school, the child learns to associate words with everyday objects and experiences in his home, neighborhood, school, and playground. The teacher's efforts to make the formal work of the school meaningful to the young child constitute the first stage in cultivating the ability to make applications. Children as young as 4 years often spontaneously intellectualize certain problems and discover cause-and-effect relationships. A majority of applications made by young children, however, consist of the use of abstractions of a relatively low order with a highly restricted range of application. Such abstractions usually evolve from their own life situations as they see them. We do not expect a high degree of ability to associate facts during the "What's this?" and "What's that?" period, but we anticipate that the child will soon detect organization in knowledge and solve simple problems as a result of his own understanding of relationships.

Toward the beginning of the junior-high-school period, the typical learner will have acquired ability to apply many facts in his possession. Here the pupil is introduced to *principles* in such fields as social and natural science and mathematics. Ob-

viously, the ability to make applications is even more important during the senior-high-school and college years.

Varying stages in the degree to which ability to apply may be demonstrated are shown in Fig. 20. The expansion of the ability during mental growth is suggestive of increase in the transfer of training.

First, there is the ability of the young child to make associations between objects in his immediate environment, which is

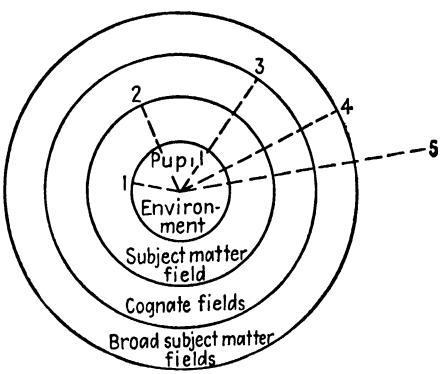


FIG. 20.—Expansion of ability to apply knowledge.

graphically limited at point 1. Second, his ability later increases to point 2, at which he may be expected to apply learning in one unit of a course to other material in the same course. Third, at point 3 there should be ability to make applications in other courses or fields of similar subject matter. Fourth, at point 4, his ability has extended so as to include applications in broad fields of knowledge as defined in terms of subject matter. Finally, at point 5, there is ability to integrate all fields of knowledge into a unified whole and to disregard subject-matter distinctions. The first level is relatively easy and the others increasingly complex and difficult. The final level is, in fact, so difficult that it can be achieved by only a few scholars who have devoted a lifetime of study to search for interrelationships in knowledge.

In obtaining material for use in cultivating the ability to apply

principles, it is necessary to prepare special situations which will require pupils to draw upon facts already in their possession. Many opportunities will be found among omissions in direct chains of reasoning in a textbook, as in situations in which the author has assumed that many readers do not need complete explanation. Other opportunities for application may be found by the teacher among other sources of information which may be suggested by his broader understanding of the subject-matter field.

Applications to everyday life are particularly meaningful and afford possibilities for increasing the realism of instruction. In some subjects references to daily life constitute the most favorable opportunities to apply principles. In others, opportunities may be found either to enlarge upon or to simplify the complexity of organization within the field itself. In all responses in which application of principles is stressed, two elements are essential. The learner should be required to state (1) what the result or the effect of a certain principle will be and (2) the principle that justifies his conclusion. Discussion of the effects of alternative principles may provide additional opportunity to cultivate this ability.

Measuring this ability may consist of confronting the pupil with an unfamiliar problem situation and requiring him to decide what will happen and then to support his decision. It is important that the pupil make a decision and not give one that he remembers as an earlier discussed solution. Thus the differentiation between familiar and unfamiliar problem situations is fine but nonetheless essential. The reason must be insisted upon in order to determine whether the pupil is fully aware of the principle that he is applying.

Pupil responses may be obtained through test situations followed by recall questions. Careful formulation of such questions is important, in order to make certain that the pupil formulate a statement of the principle. It is usually better to ask separate questions for each desired response. For example, he may be

asked in one question to state what happens and in another to formulate the principle involved. The following situation [6] may be used for illustration:

Water is being poured into a tall slender jar.

1. What will happen to the pitch of the sound arising from the jar while it is being filled?
2. State your reasons for believing that change in pitch will or will not occur.

The responses may be directed by providing multiple-choice statements, several predictions concerning the pitch of the sound, and several principles. The learner is required to indicate those which are appropriate:

Predictions:

a. The pitch will remain the same. ( )
b. The pitch will become higher. ( )
c. The pitch will become lower. ( )

Principles:

1. The pitch of a sound is synonymous with its frequency. ( )
2. Disturbance of air is called sound. ( )
3. The wave length of the sound from a vibrating water column depends directly upon its length. ( )

It may be observed that items of either recall or recognition types may be formulated.

It is possible to suggest only the essential principles that govern the appropriateness of questions relating to the ability to apply. The opportunities for cultivating this ability vary with different types of subject matter and the maturity of learners. It is of utmost importance that pupils be confronted with *new* opportunities in which to make use of their knowledge and that they be required to demonstrate, by giving *reasons*, that they are associating an event with a principle.

[6] Test 1.3, "Application of Principles," Progressive Education Association, Columbus, Ohio, 1937.

Ability to Locate Sources of Information

It is of distinct advantage to pupils to know where to obtain information, as much so perhaps as to have mastered facts and information. Ability to consult organized sources of information is infrequently acquired by younger children. Facts that they may be expected to discover are likely to be limited by their personal experiences. Gathering wild flowers, learning names of birds, and searching for various kinds of rock and mineral are suggestive of the types of information gathering which are most appropriate during early stages of development.

Toward the beginning of the junior high school, the pupils' attention may be readily directed to availability of information in organized forms. For additional information concerning a topic of interest, they may be directed to consult various types of reference material. Social sciences, natural sciences, and English afford wide possibilities for the cultivation of this ability. Practice in the attainment of the ability may be provided through the use of elementary research reports, library investigations, and reviews of writings. It is important to remember that this ability involves familiarity with classification of information and various types of relationship among facts.

Varied experiences in searching for information are essential, and improvement is a product of gradual growth. The most familiar incentive to search for information originates in curiosity and the desire for meaning. The dictionary is frequently the most important source of information during early ages. Later, encyclopedic matter is consulted and, with more advanced study, consultation of highly specialized material is undertaken.

Cultivation of the ability consists in formulating situations that require more complete information than is contained in the textbook. Pupils should be required to make frequent special investigations to familiarize themselves with comprehensive sources of material in which they must search here and there for facts satisfying their particular requirements.

Unless development in the ability to locate information is measured, success in its cultivation will remain largely a matter of speculation. The ability is not fully measured by requiring pupils to list types of reference material that have come to their attention. Use of more specific measuring situations is preferable. One form of objective test [7] that uses recognition items may be illustrated as follows:

(The directions require pupils to designate the most probable source, the source which might be helpful but not so certainly, and the source which is not considered worth while using.)

A. What causes the tides?

—— 1. Physics textbook
—— 2. *Popular Mechanics*
—— 3. Textbook on meteorology
—— 4. *Encyclopaedia Britannica*
—— 5. *Science Digest*

The *Iowa Silent Reading Tests* [8] provide a section for measuring ability to locate information in an index. The following excerpt is reproduced to illustrate the type of index provided:

Alaska: Agricultural possibilities, 213, 214; commerce, 214, 215; exports (Fig. 147); fisheries and forests, 210-212; fur farms, 210; imports, 214, map (Fig. 129), facing 197.

Corn: In America, 187; Argentina, 282; United States exports (Fig. 190), 282-284; plant, 187; industrial uses of, 189.

Typical questions:

1. Next to what page can you find a map of Alaska?
2. Does the index tell where to find information about the industrial uses of corn?

[7] Test 7.1, "Familiarity with Sources of Information," Progressive Education Association, Columbus, Ohio, 1938.

[8] GREENE, H. A., A. N. JORGENSEN, and V. H. KELLEY, Iowa Silent Reading Tests, New Edition, Advanced, World Book Company, Yonkers, N. Y., 1939.

3. What is the number of the figure which shows something about the export of corn from the United States?

The foregoing illustrations suggest the desirability of constructing tests to measure the ability to locate information on the basis of typical experiences. Opportunities for training may be discovered in the use of the library as well as in selection of source materials and searching for information contained in them.

Principles Summarized

The discussion up to this point has suggested that, if instruction is to provide for the child's mental growth, activities of the classroom must be the result of organized planning. Procedures that may be effective at the level of learning at which major emphasis is upon acquisition of factual material are likely to be unproductive of good learning at higher levels. For this reason it is desirable to summarize the principles that are needed in a teaching program designed to foster learning which includes abilities of a higher order.

1. Instructional aims should be formulated to encourage responses requiring the abilities that are to be cultivated by means of direct instruction. The teaching program should be planned in accordance with what the learning materials can do and not exclusively with what they are.

2. Two or three aims that may be attained through carefully designed activities should be selected in preference to a large number.

3. For each instructional aim the material must often be reorganized and supplemented with additional material in order that the desired ability may be practiced.

4. No single group of test items should attempt to measure more than one ability. A separate test, or a separate portion of a comprehensive test, should be provided for each ability.

5. Testing should be restricted to those abilities which have

been cultivated and consistently practiced during the course of instruction.

6. Testing situations requiring demonstration of abilities typical of higher levels of learning should minimize opportunity to respond on the memorization level. Recall or recognition of an earlier product of a higher level of ability may not be substituted for demonstration of such an ability upon unpracticed test material.

7. Enrichment and general improvement of the instructional program, particularly test construction, should become a continuous activity of the teacher. Under such conditions, the results of experience and the improvements made in using subject matter for the cultivation of different types of higher ability will be reflected in improved methods.

Essay Type of Examination

Although vulnerable because of its subjectivity of scoring as well as of meaning, the essay item is probably the only conventional type that makes great demand for a higher order of thinking, or at least requires the pupil to record the links in his chain of reasoning as he marshals his facts into orderly arrangement. Its unreliability may be reduced to a large extent, according to Lefever [9] and Weidemann,[10] who maintain that by proper formulation of questions and the use of suitable scoring standards, reliabilities have been attained as high as .80 as compared with reliabilities ranging from .30 to .50, which are usual, and .70, which is rare. Its reliability will be increased to the extent that we are successful in making it more objective in scoring. The objectivity of the essay-type item may be increased considerably by (1) general instruction in the art of writing a satisfactory essay answer or by including directions to the pupil in the same

[9] Lefever, D. W., Adapting measurement to the changes in secondary education, *Clearing House*, 1934, 8: 330-333.

[10] Weidemann, C. C., Recent developments in the written essay examination, *Rev. Educ. Res.*, 1935.

manner as in many standardized objective tests, (2) more careful differentiation of the objectives that the testing is to cover, (3) better formulation of essay items, and (4) preparation of a list of facts or types of performance for which the scorer is to look.

The essay-type item may be readily modified so as to yield a fairly accurate indication of progress toward a given objective. It is difficult to formulate an essay item that will not, upon analysis, be found to demand a higher degree of factual recall than at first suspected. It must be remembered that total situations, conclusions previously reached during class discussions, applications to problems, etc., may be reproduced upon examination as such and, therefore, not be true evidence of reasoning or thinking at the time. The essay-type test measures memory more often than it measures other mental processes.

Wrightstone [11] emphasizes its usefulness in determining pupil progress toward objectives such as (1) attitude toward some social, political, or economic phenomena, (2) organization of social-studies facts, (3) interpretation, evaluation, or discussion of social-studies facts, and (4) application of social-studies principles to describe events or situations.

The fact remains that it is difficult to divorce the essay-type item from its factual basis and to measure a given higher objective singly. Two items which were used to cover a geography unit of 6 weeks in a Chicago school follow:

1. What are some of the leading industries of Chicago?
2. How do you account for the rapid growth and development of Chicago?

The first item is purely a matter of memorization, but the second requires some thought, reasoning, and organization, although it might demand only the recall of conclusions given in class by

[11] WRIGHTSTONE, J. W., Are essay examinations obsolete? *Soc. Educ.*, 1937, 1: 41-45. Also FREEMAN, F. N., The monopoly of objective tests, *Educ. Forum*, 1946, 10: 389-395.

the teacher. Some types of question are extremely vague and broad. The writer recalls an examination that he took in college physical geography, the examination reading simply, "Ground water." On the other hand, an essay-type item may be made unnecessarily involved and, by overdirecting what the pupil is to write, defeat the purpose of the examination. There is much to be said in favor of providing adequate preliminary instruction in how to deal with an essay-type examination, in much the same way that the new types of examination are generally accompanied by instructions.

It will be helpful to teachers wishing to adapt the essay-type item to the measurement of progress toward a given objective, if a classification (Monroe, and modified by Lee [12]) of types of essay question is reproduced:

1. Selective recall—basis given
   Ex.: Name the presidents of the United States who had been in military life before they were elected.
2. Evaluating recall—basis given
   Ex.: Which do you consider the three most important American inventions in the nineteenth century from the standpoint of expansion and growth of transportation?
3. Comparison of two things—on a single designated basis
   Ex.: Compare the armies of the North and South in the Civil War as to leadership.
4. Comparison of two things in general
   Ex.: Compare the life of Silas Marner in Raveloe with his life in Lantern Yard.
5. Decision—for or against
   Ex.: Whom do you admire more, Washington or Lincoln? Why?
6. Cause or effect
   Ex.: Why has the Senate become a much more powerful body than the House of Representatives?

[12] LEE, J. M., *A Guide to Measurement in Secondary Schools*, D. Appleton-Century Company, Inc., New York, 1936.

7. Explanation of the use or exact meaning of some phrase or statement in a passage
   Ex.: What does "inalienable" mean in "endowed with inalienable rights"?
8. Summary of some unit of the text or of some article read
   Ex.: Summarize in a page all you have read on the life of Burns.
9. Analysis
   Ex.: Mention several qualities of leadership.
10. Statements of relationship
    Ex.: Tell the relation of exercise to good health.
11. Illustrations or examples (your own) of principles in sciences, construction in languages, etc.
    Ex.: Give two examples of your own illustrating the correct use of participles.
12. Classification—usually the converse of No. 11
    Ex.: What is the principle involved in the following problems?
13. Application of rules or principles in new situations
    Ex.: What would you expect "numerology" to mean?
14. Discussion
    Ex.: Discuss the Monroe Doctrine in one page.
15. Statement of aim—author's purpose in his selection or organization of material
    Ex.: What was the purpose of introducing this incident?
16. Criticism—as to the adequacy, correctness, or relevancy of a printed statement, or a classmate's answer to a question of the lesson
    Ex.: In what ways might the statement published by the —— Society be criticized?
17. Outline
    Ex.: Outline the important events in the development of the United States as an industrial nation from 1800 to 1900.
18. Reorganization of facts
    Ex.: (The student is asked for reports where facts from different organizations are arranged on an entirely new basis.)

19. Formulation of new questions—problems and questions raised
    Ex.: What else must you know in order to understand the matter under consideration?
20. New methods of procedure
    Ex.: Suggest a plan for proving the truth or falsity of some hypothesis.

The essay-type item frequently demands a type of ability in which the pupil is still untrained, even at the end of a course. It requires him to apply certain principles even though he has not practiced application of principles. It may require him to summarize and synthesize the facts concerning a given topic even though information presented during instruction has been limited to analysis. Pupils should not be penalized for deficiency in an ability in which they have not been trained. The only justification for including untaught abilities in a testing program is in the case of diagnostic or instructional tests, by means of which the teacher may discover pupil weaknesses, provide practice in certain abilities, or isolate individual problems.

Recall versus Recognition Responses

Emphasis upon instructional aims indicative of learning above the memorization level invites reexamination of recall and recognition as types of response to be used in testing situations.

Traditional testing techniques in the case of verbal learning tend to stress the ability of the individual to recall and reproduce material in substantially its original form. Types of examination requiring this response vary from those consisting of essay items to those seeking relatively short answers or supplying blanks for completion. In many types, the learner is given cues that limit the range of possible responses, whereas an essay item may encourage him to submit an almost unlimited amount of discussion as his answer.

Within recent years, emphasis in testing has been attracted toward recognition types of response, in which answers are pro-

posed by the test maker and the learner is required to select the appropriate ones. The trend toward recognition types of response is probably due to considerations of efficiency rather than hope of gaining greater insight into the nature of the learning that has occurred. Their use provides a high degree of objectivity in scoring large numbers of test papers with a minimum of effort. Objectivity in scoring increases the dependability of measures obtained in studying large school populations and provides a convenient basis for establishing norms.

The general use of the recognition item for purposes not directly serving the pupil tends to obscure many of its limitations as as aid in classroom instruction and testing. An individual may recall much information that he does not recognize, as for example when he repeats in his writing the words of an author without being aware that he is borrowing. He may recognize many facts, when brought into consciousness, that he had not previously recalled. He will generally report an event more accurately if allowed to do so in his own words than if questioned categorically in the manner of a cross examination.

Among the advantages claimed for the recognition item is its objectivity in scoring. This makes possible greater statistical reliability. Items may be made to measure one essential fact at a time and cover a broad field of information with minimum effort for the learner, although doing so with a slight loss of accuracy and thoroughness. Recognition items do not encourage cramming, which learners frequently associate with the learning of material to be recalled. Also, they may be scored rapidly by inexperienced persons.

If recognition tests are not carefully constructed, they tend to measure little more than factual information. They make no provision for organizing ability since they depend upon selection among the responses provided. They reveal mainly the test maker's point of view toward correctness of a response. They present learning materials in an artificial arrangement which is typical

of neither classroom learning nor life situations. Superficial study habits are encouraged. Individuals may often earn high scores on the basis of guessing or general ability.

The recall type of response, on the other hand, is consistent with study methods, permits accuracy of detail and flexibility of individual expression, and encourages review. Recall is more difficult for an individual who can generally recognize many more facts than he can recall. Consequently, success in recall may be considered evidence of greater accuracy in learning. Recall items are more easily constructed, since direct questioning is a natural manner of soliciting information. More importantly, they do not require a teacher to spend excessive time constructing long series of relevant and irrelevant responses such as recognition items make necessary.

Among the limitations of recall responses is their subjectivity of scoring, since extraneous factors influence evaluation. Statistical reliability is less easily obtained, and they may not measure consistently. Verbal facility of pupils may sometimes disguise their lack of real knowledge. The cues associated with the desired responses may be inadequate. Pupils may know more than they can demonstrate because of uncertainty as to the intent of a question.

Those who argue for the recognition type of response claim that, since answers are provided, stress is placed upon ability to discriminate, to think, to reason, whereas recall types place a premium upon facts stored in memory. Careful examination of recognition tests shows, however, that they too, as conventionally constructed, are measures of factual mastery and ability to recall. Many facts must be recalled in order to evaluate proposed recognition responses.

Pupils tend to adapt their methods of study to the types of response that they believe will be required upon examination. If recall items are expected, effort is made to master facts that they are likely to be required to recall. If recognition items are

expected, pupils are likely to study with reference to general points of view and to acquire extensive if not thorough knowledge. Study in preparation for recognition items may be more superficial, since the pupil has little idea of the steps that he may take to improve his ability to make successful responses in a true-false or multiple-choice examination.

Many of the limitations of the recall method may be minimized by care in formulating items. The range of possibilities of various responses may be reduced by regulating the scope of questions. If rapid and extensive coverage is necessary, short recall items may be used as effectively as most types of recognition items. Subjectivity in scoring has little important bearing upon classroom testing since the teacher's personality cannot be eliminated from instructional procedures. The hazard of variability in scoring is principally significant only from a research point of view. In fact, recall items reveal more to a teacher than do relatively impersonal recognition items. If recall items are carefully formulated and are focused upon desirable instructional aims, they will result in an "acid test" of learning.

PROBLEMS FOR DISCUSSION

1. Characterize briefly a vaguely remembered course of study pursued during your school years, and (*a*) analyze the nature of the gains of which you are still aware and (*b*) describe any subsequent learning experiences facilitated by such early instruction.
2. Account for inadequate provision in a majority of courses of study for cultivation of abilities other than that of demonstrating possession of information.
3. Suggest certain abilities which many teachers fail to cultivate during instruction but which by implication they often recognize as objectives when formulating test items. To what extent may such abilities develop spontaneously during a

course so conducted? Discuss the effectiveness of opportunities for specific practice in all abilities sought.

4. To what extent may we expect a relationship between intelligence and higher abilities? Suggest how capacity for abstract thinking and adaptability to new situations may be involved in this relationship.
5. Discuss the importance of consistency between selected instructional objectives, teaching procedures, and the testing program.
6. Describe any of your learning experiences in a classroom which definitely gave you the impression that your teacher hoped to cultivate abilities other than that of recall or recognition of specific information.
7. In a field of teaching in which you may be interested outline several instructional objectives. Suggest how it may be necessary for your purposes to amplify available learning materials, and outline the types of testing situation that you would present in order to measure attainment in selected objectives.
8. If you wish to measure attainment in an objective such as ability to draw conclusions from given data, why must your testing situations be new and different from any presented during instruction as practice material? What would be a result of violating this principle?
9. Discuss the role of facts and information in learning, with special reference to their significance in situations involving higher abilities.
10. Discuss how the philosophy implicit in the emphasis upon cultivating higher abilities is by no means new doctrine. For example, reflect upon the many times you have heard such statements as "When you go to school, you don't learn everything from a book," or "Children nowadays are not taught how to think." Comment briefly upon the belief of some that educated people as a class experience difficulty in applying theory to practical situations.

11. Discuss the essay item as a technique for (*a*) directing learning and (*b*) evaluating the results of learning.
12. Evaluate recall and recognition as types of response to be encouraged in learning and testing.
13. Give your reaction to a criticism voiced by a distinguished newspaper man: "Tests are made out by teachers nowadays which can hardly do otherwise than develop a nation of half-wits. The questions are not questions but statements concerning the schoolwork, and all the pupil is required to do is to write 'true' or 'false.'"
14. Give your reaction to the following statement of the same critic: "The teachers write half a sentence, then list three or four possibilities for ending it, inviting the child to select the correct one. The teachers do all the work. The pupil merely puts a check so as not to strain—or use—his poor little brain, although the primary reason for education is to teach people to think."

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CHAPTER VIII

Testing for Learning

After materials have been organized, teaching aims formulated, and testing situations devised, programs for giving tests may be outlined. At this point, two related problems of planning such a program present themselves. These include (1) determination of appropriate times during the course of instruction for giving tests and (2) the uses to be made of test results. The place of tests in a course of instruction as well as the frequency of their administration depends mainly upon the use to be made of the results. The effectiveness of the entire program is determined by the extent to which test results reflect progress in attaining the aims formulated.

Testing and the Course of Learning

Programs for testing make use of plans which may be classified as those which use (1) tests to be given before formal instruction and study begin, (2) tests to be given at any time on material that has been studied between the beginning of a subject and its completion, and (3) tests to be administered over broad fields of subject matter after the completion of individual courses. The first two plans are definitely related to the course of learning

in specific subjects, whereas the third assumes a testing program that is as continuous as learning itself.

Testing Previous to Instruction and Study

A desirable use of a test is to survey at the beginning of a course the pupil's background and the extent to which any abilities have already been developed. Certain work skills and habits may also be appraised through this initial testing. The results of initial testing may be compared with those of a testing period at a later date, as, for example, at the completion of a subject, in order to determine the extent of progress in the development of the abilities tested. Initial testing results may be used as a guide to teaching methods and to special provisions for individual needs. The test may serve to clarify misconceptions regarding the purposes of tests and to create a cooperative attitude between teacher and pupil.

Similarly, the plan may be used at the beginning of either a specific assignment or a major unit of material as a means of determining the needs of the pupils. One form of test may be used for initial testing of learning and a comparable form to measure the results of instruction. The pretest can be used profitably wherever a certain amount of previous knowledge or incidental learning is a prerequisite to good understanding of subject matter. It may inform the pupil of the quality of his preparation, thus suggesting the need for more study in some aspects of subject matter than in others. If the pupil knows that a pretest is given for guidance and not for penalizing poor accomplishment, its psychological effect is good.

Testing during the Course of Instruction and Study

If tests are made an integral part of learning, it follows that they may be given at any time from the beginning of a course until its completion. Tests so given should indicate the extent to which objectives are being attained as well as the nature and degree of error in learning. If the times at which they are given

are in proper proportion to the amount of subject matter covered, they may be legitimately used during the course of instruction, both as a basis of guidance and as a measure of accomplishment.

Four plans for testing during the course of learning will be briefly described: (1) testing to follow specific assignments, (2) testing to follow completion of major units of work, (3) testing over the entire range of material—the final comprehensive examination, and (4) testing over broad fields of knowledge.

1. *Tests Designed to Follow Specific Assignments.* Testing designed to follow specific assignments is usual in the elementary- and secondary-school grades but is less common as the higher educational levels are reached. Tests used to accompany specific assignments are intimately related to learning. They are used primarily to analyze pupil difficulties, measure growth, and provide the teacher with materials for guidance.

The plan of testing following specific assignments accustoms pupils to types of test situation that may be used later. It is helpful in clarifying misconceptions, in directing attention to the most significant material, and in providing the learner with a means of securing immediate recognition for his efforts in completing specific assignments. It also furnishes the teacher with an abundance of pupil reactions to situations related to teaching objectives. Such reactions may be reformulated and subsequently used in preparing more important comprehensive tests and examinations. Teachers may require pupils to formulate answers to short tests as homework, frequently assigning problems or special questions necessitating types of ability sought as aims of the course.

In general, the short tests given during the class period or assigned as homework exercises should be regarded as teaching material. Pupils may be assured that the purpose of such work is to provide practice and that although they will be informed of their proficiency, their ultimate record will not be greatly affected, provided their performance has been consistent. The

burden of correcting frequent short tests and written exercises may be shared by members of the class.

The instructional or work-type tests closely fit the ideal instructional program because they immediately provide practice situations for the learner. The testing situation should properly represent all instructional aims formulated for a subject, a sufficient quantity of items being provided for the measurement of each objective. Some teachers use the term *work sheet* in order to avoid the unfortunate connotation of the word *test* and to encourage pupils to appraise results of their effort. The use of such materials vitalizes instruction by making possible applications to local situations and preventing the textbook from dominating instruction.

Instructional or work-type tests are geared so intimately to the process of developing understanding of the subject matter that they tend to lose their identity as tests. They justify their name in that they may be scored. This quality distinguishes them from drill exercises and enables the extent of progress in each instructional aim to be observed.

2. *Tests to Follow Completion of Major Units of Work.* Wherever subject matter is organized into broad meaningful units embracing closely related and interdependent materials, whether by textbook or by specially prepared syllabus, we have a logical basis for giving tests.

Within limits, the larger and more comprehensive the units of subject matter, the greater the economy of learning and of testing. Numerous small units encourage the learner to study by parts and to memorize facts without their proper assimilation and relationship. A few large comprehensive units afford opportunity for developing broad concepts and determining relationships between masses of detail. The testing program should be planned in accordance with the organization of learning material.

Tests given on material of each unit afford a sound basis for determining difficulties and needs of pupils before beginning a new unit of subject matter upon which subsequent units depend.

These tests, like those accompanying specific assignments, should be used primarily for instruction and guidance, even though they may be sufficiently valid for use as measures of accomplishment. They serve to reveal the nature and extent of error in learning, and they afford a basis for supplementary instruction inasmuch as difficulties are revealed as learning continues from unit to unit. They also harmonize with systematic reviews which are usually scheduled to accompany the completion of major units.

Although the frequent short tests designed to follow specific assignments as well as problems and exercises in the form of homework should be regarded principally as a means of instruction, tests designed to follow completion of major units of work may be used for both instruction and evaluation. The results of such tests may be treated analytically so as to indicate wherein the pupil's learning is deficient, to establish a basis for correcting difficulties and errors, and to determine whether the pupil is ready to proceed with remaining units of a course. Because the comprehensive nature of most units permits construction of tests that are reliable and valid, their results also afford a sound basis for evaluating the learner's achievement.

3. *Testing over the Entire Material.* In the light of the preceding discussion, the final comprehensive examination should constitute one more link in a chain of testing during the course of instruction. It may be justified only if it facilitates the advancement of learning and serves as an adequate basis of appraisal. The short tests accompanying specific assignments and the longer ones covering major units of material serve to measure stages in learning. This program should reach its culmination in the final examination, which should require the learner to demonstrate more fully and accurately than heretofore the knowledge that he has gained during his preceding instruction and study.

The final examination provides opportunity to reveal the learning abilities acquired by the student and thus furnishes a sound basis for his rating. It measures the extent to which the pupil has retained his knowledge, particularly that gained during the

early and intermediate stages of the course. It furnishes evidence concerning the thoroughness of learning. The teacher may measure the extent of attainment of the aims formulated at the beginning of a course. The short quizzes and tests preceding merely indicate stages in the development of these aims. Anticipation of a final examination stimulates the learner to study his material as a whole, to synthesize his knowledge, to form a chain in his thinking—to keep in repair his entire foundation of learning.

The final examination may be similar in structure to previous tests except that it need not provide for analysis and diagnosis. It may be expected to reveal, if its results are compared with those of previous tests in a course, progress in attaining selected objectives. Although its results may not be used as a basis of further instruction, they nevertheless make it possible to judge effectiveness in attaining objectives.[1]

4. *Testing upon Broad Fields of Subject Matter.* Testing in the broad sense is as continuous and necessary as learning itself. A criticism that may be made of learning and of testing in school and college is the stress placed upon numerous courses restricted to a quarter or semester and the recognition of their completion by a final comprehensive examination. The practice at best encourages the pupil to learn superficially only a small sample of a broad field and to forget what he has learned as soon as the course has been completed. Even though the present system is retained, testing may be planned to serve a wider and more useful purpose.

Testing programs should be expanded so as to include broad fields of subject matter irrespective of courses in the learner's schedule. If comprehensive tests are designed for the measurement of higher abilities as well as the ability to demonstrate specific skills and to recall and reproduce facts, they will indicate

[1] Some teachers recommend that a schedule be arranged for students to discuss with their teachers the results of the final examination. If this practice is followed, there will be opportunity for still further learning.

the extent to which the individual is growing in depth of knowledge and understanding. They should be given principally for guidance and thus made to serve as a constant stimulus for improvement. Testing over broad fields reveals the effectiveness of teaching objectives stressed in particular courses. It also measures the extent to which the learner is gaining new knowledge and deeper insight as a result of his school experience and increased maturity.

Planning the Testing Program

Frequency of Giving Tests

There is no optimum frequency with which tests should be given, nor will any single plan for their administration serve every teaching purpose. The results of testing programs determine most effectively whether they have been wisely planned. Similar results may not be expected for a fixed program in all classroom situations because of variable factors, such as type of subject matter, needs of pupils, and other influences. Teachers vary in opinion from those who like a short test every day to those who seldom give tests. Prevailing teacher opinion favors giving tests weekly slightly more than giving them twice a week.

Frequent testing often has the same effect as additional study or practice. Testing, however, may be overdone. The inevitable lessening of the amount of time available for study and instruction tends to reduce the amount of learning practice and to diminish ultimate achievement. There must be opportunity for achievement as well as analysis.

On the other hand, tests should be administered frequently enough to enable the teacher to become acquainted with the thought processes of pupils. It is important to know why pupils react as they do in test situations, whether they react consistently, and whether they respond significantly in unexpected ways. Testing frequently reveals a need for reshaping instructional procedures. Testing readily becomes mechanized unless the teacher

studies continuously revised evidence concerning the progress of intellectual development. To be impartial in the classroom is a desirable aim; but objectivity in measurement, a quality helpful in attaining this aim, must not lead toward indifference to the modes of thinking of individual pupils. The teacher must be fair and just but not impersonal or insensitive. Tests should be fully utilized as a means of gaining better understanding of the individual.

Enlisting Pupil Cooperation

The type of test that a pupil expects influences the manner in which he studies; hence, frequent tests illustrative of the desired teaching aims apply continuous direction to the course of learning. They encourage study habits which persist as an important element in the abilities to be developed. The learner will memorize facts and principles without conscious effort to understand if he feels reasonably certain he will not be required to demonstrate understanding. Anticipation of an objective test stressing factual information will encourage mastery of detailed facts. Knowledge that an essay examination is to be given tends to focus the pupils' emphasis upon large units of subject matter. Guidance in the best study and learning techniques for tests stressing different abilities may valuably supplement direct instruction.

A testing program is improperly administered unless it creates wholesome relationships between pupils and teachers. Testing may frequently become boring. Often the earnestness with which pupils take a test, the pressure of working within time limits, and the stimulating effect of rivalry—all create emotional states which have unfavorable effects upon learning. No one can defend a testing program that results in frustration.

Tests administered with maintenance of standards in view or those which have been characterized as "policial" tests may become particularly offensive in this respect. Instructional and diagnostic tests should properly attempt to enlist the cooperation of the pupil and furnish him with a means of self-appraisal, but

should not be used so frequently as to disrupt the harmony of the classroom or endanger the mental health of the learner.

The testing program should be so carefully planned that the pupils know in advance that tests will be given, of what types they will be, and upon what instructional material they will be based. It is difficult to defend the practice of "springing" tests without warning. The obvious purpose in doing so is to discover whether pupils have their current assignments of work up to date or to exclude the variable factor of last minute cramming, which anticipation of a test might encourage. The first purpose may be unnecessary if classroom instruction is efficient, and the second deliberately deprives pupils of the gain in learning that results from preparation for a test.

Testing with regularity is desirable, provided the program is not highly routinized. Care must be taken not to complicate the program. If the subject lends itself readily to division into units, tests may be scheduled to occur upon completion of each unit. Beyond this point, the procedure should not be rigidly formalized.

If tests are to serve the purpose of guidance, pupils should be given the results of tests. This practice has considerable motivating value and increases the instructional usefulness of tests. Pupils may require assistance in interpreting test scores, especially when tests provide separate parts for measuring different abilities sought as teaching aims. Single scores for tests so differentiated are difficult to calculate and, if obtained by weighting the scores for each of the parts, may be somewhat misleading. It will simplify the interpretation of results if no attempt is made to combine scores.

Test results should reveal analytic as well as composite results, and individual as well as group performance. For example, a pupil may learn that his score on the part of the test measuring *ability to apply principles* is low and that his score on the part measuring *ability to recall facts* is high. He may be encouraged to record his performance from one testing period to another, and in this way testing may become personal to him. On the

other hand, performance of the group in the various abilities may be discussed.

The instructional value of tests sometimes may be increased by permitting pupils to score the papers. This activity has the effect of emphasizing correct solutions, although the gain to be derived may be through memorization. During the correction, however, there may be discussion leading to improvement in ability to approach problems or evaluate evidence for a given solution. Tests may be returned to pupils with instructions to prepare answers for questions incorrectly answered. The correction by pupils will be made most accurately in the case of objective items. Appraisal of essay items should usually be made by the teacher. The individual situation will determine whether each pupil should score his own test or that of another member of the group.

Getting Maximum Value from Testing

The indecision that characterizes present-day testing indicates that we are in a transition period with respect to purposes of tests and the methods of their administration. The *how* in measurement has made the most satisfactory progress of any of the phases of testing, as evidenced by the quantity of complex techniques available for the construction of structurally dependable measuring instruments.

Promising advance has been made toward redefinition of *what* to measure, as indicated by the movement in the direction of evaluating varied aspects of mental growth. Pupil attainment is being referred to in terms of progress toward teaching aims representing mental processes other than accumulation of factual information. Emphasis is also shifting to improvement of the learner as an individual rather than as a member of a group.

Testing theory is beginning to emphasize two additional aspects of measurement, namely, the *when* in measurement, which refers to the frequency of test administration. Our discussion at this point will deal principally with the *why* of testing.

There is a widespread acceptance of state and national testing programs, without careful study of the actual gain, if any, to be derived educationally from such programs. The standardized tests of such programs have undoubtedly done much to emphasize the importance of careful test construction. There is considerable value to a teacher in knowing how pupils compare in achievement with those of a larger group. There is a tendency in such programs, however, to standardize instruction unduly by causing teachers to prepare pupils for such examinations.

There is no convincing evidence, however, that academic success can be measured more accurately by means of standardized test scores than by teachers' marks based upon locally made tests and sound judgment. Teacher opinion is still in favor of locally made tests.

A desirable degree of cooperation has been lacking between teachers and test makers. It cannot be expected that standardized tests will be completely satisfactory until the test maker is in a position to provide for the needs of different schools, different teachers, and variations in teaching aims. Until a desirable degree of cooperation is attained, it will be necessary for individual teachers to depend upon improved locally constructed tests.

A further evidence that teachers do not know what to do with the highly perfected techniques of testing is apparent in the widely prevalent practice of "hand-to-mouth" testing. Tests of questionable reliability and validity are still hastily prepared for the purpose of satisfying the teacher as to the extent of mastery of textbook materials. Such tests frequently lack almost all the qualities essential for the proper evaluation of achievement and are devoid of possibilities for instructional use.

They may include tests administered (1) to utilize fear of the test as a spur to diligent study, (2) to utilize test scores as a basis upon which to defend subjective marking (some teachers state that following a difficult test they can assign marks about as they please without risk of argument on the part of pupils), (3) to

punctuate the completion of a unit of subject matter—the test is made the goal, not the proper assimilation of the subject matter or the development of its instructional possibilities, or (4) to favor the meager learning that may occur as a result of last-minute cramming, particularly on the part of pupils whom the instruction has failed to interest. The point of most general agreement among teachers regarding the uses of tests is that they serve as the basis for marks. A variety of vaguely defined motives underlie testing. Frequently the goals actually sought are as meaningless in the learning program as the subject matter is to pupils, who are merely required to memorize and to develop no other worth-while abilities.

Fortunately, the purposes of testing are being redefined, and the redefinition is in a transition stage between the traditional concept of testing (administration of examinations that are to a large extent goals in themselves) and a relatively functional viewpoint (use of tests in ways that may best serve pupil development).

Discussion of purposes served by tests may thus be dealt with under two categories: (1) those which serve the pupil indirectly —achievement, final examination, etc., and (2) those which serve the pupil directly—unit-type, instructional, diagnostic, etc.

Testing That Serves the Pupil Indirectly

Testing to establish a basis of promotion and maintenance of standards serves the interest of the pupil indirectly, and then only as the administrative and supervisory staff sees fit to make use of the results. Frequently, this type of testing is designed to serve only these particular purposes and has limited opportunity to improve learning. Educationally, the motivating value of administration-serving tests is decidedly negative, inasmuch as learning, when inspired by no genuine interest on the part of the learner, ensures no reward other than the advantage of passing the course or attaining a certain ranking in the group.

Nor is there evidence that tests so used tend to improve the

quality of instruction. In fact, they often operate in the opposite direction and perpetuate the quality of teaching and learning that precedes them. So long as the goals of teaching and learning that are reflected in the tests remain static, little change may be expected to occur in the traditional pattern of instruction. Because of the temptation to teach for the examination and the school and not for the pupil, the force of instruction is likely to be spent toward that end only. Not until tests are designed from the standpoint of helpfulness to the individual in the development of his abilities and processes of thinking will the quality of instruction be unhampered by the very instruments that should seek to improve it.

Setting up standards of performance assumes that it is possible to rank the individual within the group and to do so validly for *all* members of the group. If pupil differences in ability are considered, such standards may not be valid for *any* member of the group. Educators accept the doctrine of individual differences in principle, insisting that human variability demands flexibility in instruction. But in practice they do not take fully into account the fact that true evaluation of performance may be made only in terms of how much the pupil has improved individually with reference to his ability and industry.

Ranking pupils within a group involves a comparison of individuals whose capacities, interests, and aptitudes are definitely known not to be identical. At best, marking systems demand comparisons of incomparables. Upon the assumption that instruction is equally effective at all times with the members of a given group and that all pupils display equal application and effort, the distribution of marks for the group may reflect only the range of individual differences within the group and not constitute a valid measure of an individual with respect to himself.

Under such conditions, achievement examinations used to serve the school measure differences in ability and do not necessarily determine what is fully as important—the extent to which the individual has made effective use of his initial abilities or has

developed new ones. In other words, we have made a *relative* measurement, but we have not even approached *absolute* measurement.

Tests that aim to uphold standards of the school usually cannot sample situations to which a pupil may react widely enough to warrant using the results to reveal weaknesses, gaps in knowledge, or errors. Their inadequacy in diagnosis, therefore, becomes apparent. We use the theory of sampling in test construction and in judging the extent to which pupils might have answered questions completely and minutely covering the teaching aims. In practice, wide sampling beyond a certain point is not the rule. On the contrary, if a test were designed exclusively for diagnosis, it might prove cumbersome and unwieldy as an instrument to serve administrative and supervisory purposes. In short, conveniently scored tests that serve the school may lack the qualities necessary to serve the pupil.

The school often provides no special encouragement to teachers wishing to plan instruction and testing from the standpoint of the development of thinking. Administrators themselves are frequently obliged to compare total school efficiency with that of comparable schools on the basis of standardized tests, upon which the learner's range of information is at a premium. Covering learning material with such an aim is thus encouraged, with the result that the *quantity* of learning is more highly stressed than the *quality*.

Testing That Serves the Pupil Directly

Testing that serves the interests of pupils includes the use of tests as part of the guidance activities of the school. The formal guidance program of a school may use various types of test, including intelligence tests, prognostic tests, interest questionnaires, aptitude tests, personality and social-adjustment inventories. As teachers we are only indirectly concerned with such testing, since it is usually administered by a specially trained staff member, who uses standardized tests. The results of such testing, however,

should be available to teachers in order that they may better understand pupils as individuals and compare personal observations with test findings.

Broadly speaking, we should regard all instructional activity as guidance, whether it is counseling apart from subject-matter emphasis or direction of learning through subject matter. Consequently, tests that serve the pupil should be considered devices to aid and orient him toward the fullest possible development of his individual abilities.

Lindquist [2] says, with regard to the role of tests,

> It is now generally conceded that one of the major functions of educational measurement is to enable the teacher, the guidance counselor, and the school administrator to become more intimately acquainted with each individual pupil in order that more adequate provision may be made for individual differences in all phases of the educational program. This use of tests is now regarded by many as not only one of the major functions but as *the* major function of tests, to which all other uses should be definitely subordinated and with which no other use should be permitted to interfere.

The dominant note of a testing program from the pupil's point of view should be to teach so that formal measurement of progress may be made through use of instruments that are largely diagnostic and the need eliminated for "policial" or standards-enforcement types of test. Good teaching can reduce to a minimum the hurdle-jumping aspects of achievement testing.

The testing program is likely to undergo modification because of changing viewpoints in teaching aims and the development of measuring instruments designed to determine attainment in such aims. There will also be wider use of tests as diagnostic and instructional instruments in which teaching and testing are closely integrated. Another influence that will modify purposes to be served by testing is the tendency to recognize that true

[2] LINDQUIST, E. F., Changing values in educational measurement, *Educ. Rec.*, 1936, 17: 64-81.

evaluation of pupil accomplishment should be in terms of gain to the individual in relation to capacity, interests, and application.

The general basis for modification of the testing program will be (1) provision of separate tests or tests distinctly differentiated into separate parts to provide material specifically designed to measure abilities related to instructional aims, and (2) extension of use of diagnostic tests for instructional guidance.

The conflict between teaching and assigning marks has tended to impair the quality of the school product. The problem consists essentially in reconciling tests that recognize the individual and attempt to do something worth while for him, with the hurdle-jumping type of test, upon which the administrative and supervisory staff of the school will insist for some time.

A philosophy of testing should lay maximum stress upon the value of tests for instruction, their contribution to well-ordered learning. Tests should reveal to the pupil what he is to study by keeping before him situations that are characteristic of the aims of teaching. If tests do not effectively foster intellectual growth and direct the course of learning, their possibilities have not been fully utilized.

PROBLEMS FOR DISCUSSION

1. For what purposes may tests be profitably used in advance of formal instruction and study? What types of test would be most appropriate?
2. Discuss the preparation and use of instructional tests. What advantage may such tests possess over those which are designed for formal evaluation?
3. In what respects should the frequency of tests be governed by the organization of learning materials? Discuss the undesirability of giving tests (*a*) too frequently or (*b*) too infrequently.
4. Comment on testing practices in which a teacher (*a*) gives tests without informing pupils in advance, (*b*) announces

tests in advance but presents test items for which pupils are inadequately prepared, (*c*) informs pupils of the general nature of a test and uses items related to types of ability practiced, or (*d*) distributes lists of questions or test items, telling pupils to have responses in readiness for the test.

5. Suggest how a teacher may minimize emotional distress often experienced in taking tests. Describe attitudes, frustrations, bewilderment, and faulty methods of study that may result from certain testing procedures.
6. Upon what basis may we conclude that all learning involves testing of some sort?
7. Summarize various conditions that encourage cramming for tests. Distinguish between cramming and a type of review that may be encouraged. Name several desirable teaching procedures for minimizing cramming.
8. Describe how the term "course of learning" refers to a process of development rather than to a series of memorization tasks.
9. Discuss the conflict between testing that serves the school and testing that serves the pupil, describing scholastic standards and differences in mental ability as related issues.
10. Teachers are often encouraged to pass all pupils. What effect may such a policy have upon the traditional use of tests as a basis for promotion?
11. Outline major procedures that you would follow if you were completely free to report a pupil's achievement as satisfactory when the limits of his mental ability have been reached. In your discussion consider the evaluation of his mental capacity, types of learning experiences you would emphasize, and a basis on which you would keep the record of his achievement.
12. Discuss the extent to which you agree with the author on the significance of the final examination. Do you believe that education would be benefited by the practice of giving comprehensive examinations upon completion of major fields

during the school period? In what types of subject does the need for formal testing rarely occur?

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CHAPTER IX

The Gains of Learning

In the broad sense every evidence of learning is a test of some kind, and every result of testing is evidence of learning. In studying learning material a pupil tests himself continuously, whether responding to authoritative statements of fact or to material that necessitates complex thought and understanding. Self-testing may be observed while pupils study mathematics, spelling, and foreign languages, in which immediate verification of accuracy in response is possible. During the study of all subjects one's progress is continually undergoing evaluation, whether observable or not.

One does not learn lessons as they appear in learning materials before him. Instead, he reacts to opportunities for mental activity which his lessons suggest. The types of mastery to be required determine the nature of such activity. The learner practices such responses in anticipation of the conditions under which they may later have to be used—answering the teacher's questions, writing from memory a summary of important facts, or applying principles to new situations.

Nature of Classroom Learning

Learning activity in the classroom is a continuous process. It extends through periods of instruction and study followed by

testing, after which further instruction and study occur, and so on. The results of learning are confirmed in a regular manner by some kind of evaluation which follows consideration of difficulties and elimination of errors.

There is little difference between the process of learning during personal study and that during typical classroom activity except that testing does not take place immediately in the formal program. Considerable time may elapse between treatment of material and presentation of test situations by the teacher. But in all cases two characteristic elements appear. There is effort to practice the responses suggested by the learning material and testing to determine proficiency in making them. Directing the course of learning in the classroom, therefore, must include the entire process by providing opportunity to reveal its continuous effects.

The interrelationships among the various elements of subject matter suggest the need for organizing and reorganizing material as learning proceeds. Objective measurement, however, is usually inadequate for revealing such learning. A fact that a pupil learns one day means something far different when subsequent materials have been mastered. A fact derives meaning from the fund of information already acquired. Thus intellectual growth during instruction involves continued reorganization of learning material.

The learning task that confronts the pupil in a typical course is constantly changing. Instead of being required to seek continued improvement in performance at a constant restricted task, which might be that of memorizing a list of nonsense syllables, he is continually dealing with new material. The steady procession of new learning tasks makes it necessary to regard learning as a continuous process. To cultivate the type of learning with which the school is concerned, progressive reorganization of information is necessarily emphasized. Provision must be made for correlating facts and principles of one section of a course with those of other sections as learning proceeds.

Learning in the classroom depends vitally upon how *acquisition* and *retention* supplement each other. Acquisition refers to the cumulative effects of instruction and study when first measured, whereas retention refers to their sustained effects. During acquisition the learner rehearses various responses to learning material, relates new facts to old, develops meaning, and appraises his mastery. This aspect of learning is recognized formally when tests are used to obtain tangible evidence. Such measurement actually deals with the products of study and, therefore, with what has been retained since informal appraisal during instruction. It is usual, however, to refer to mastery of learning material up to the initial formal testing as *initial* acquisition. If our discussion were limited to learning on the memorization level, we could say that initial acquisition is essentially immediate recall.

Ability to maintain gains of learning after a substantial lapse of time following initial acquisition is referred to as retention. Without ability to retain knowledge or skills, effort to learn would be unprofitable. Sometimes retained knowledge and skills are less in quantity. Learning that is thus not retained is said to be forgotten. In the case of ability to recall facts, failure to retain is not unusual, unless the desired facts are firmly held by a broad framework of thought. In this case, forgetting occurs less rapidly.

On the other hand, we may still apply the term retention even though the results of subsequent learning have so changed the meaning of facts and information that an individual cannot recall them in original form, provided he can give evidence that they have had a permanent effect. The survival of an item of information in the form of an attitude lies within the meaning of retention, even though precise restatement of the information may be impossible.

The term *retention,* as well as the term *acquisition,* always requires qualification. The type of mastery that is acquired or retained must be stated. A pupil may display high retention of

facts but little ability to apply them. On the contrary, he may retain few facts but be able to recall and use important principles. It must be understood that acquisition and retention are measurable only with respect to the type of ability acquired or retained.

A pupil's retention in different aspects of learning therefore constitutes a variable setting for acquisition of new materials. It should be observed, however, that while the pupil is engaged in assimilating new material during a course of instruction, retention of such material is somewhat different from its retention after instruction has been completed. We are at present concerned with retention during the course of instruction while the learner continues to be influenced by changing aspects of closely related materials.

Instruction should include the testing of the interrelated contribution of (1) acquisition of new knowledge and skills and (2) retention of knowledge and skills that are in process of reorganization. During this program, pupils should reveal that they are learning proper responses to current materials against a constantly changing background of subject matter. They should also give evidence that they are making further responses to old material that is being reorganized. Thus we round out the developmental process characteristic of learning in the classroom.

Tests given during the course of instruction deal with both acquisition and retention and thus emphasize the continuous nature of learning. Short tests and quizzes following specific assignments emphasize recently acquired material. Tests that follow completion of major units, however, necessitate review and practice over extensive portions of subject matter.

Tests may be so constructed as to measure simultaneously *acquisition* in the case of a given unit of material and *retention* as related to material of preceding units. Since most final examinations cover the entire scope of a course they deal with retention ranging from long to short intervals of time.

Measurement of acquisition and retention during a course of

instruction lessens emphasis upon accumulation of facts and principles and stresses learning as a process of continuous development. Purposefully planned testing, which includes emphasis on both acquisition and retention, may stimulate types of learning that might not otherwise be developed. Development of abilities beyond the level of memorization is aided by this plan of testing.

Measuring Acquisition and Retention Simultaneously

To keep acquisition and retention in the foreground during a course of instruction requires little modification of a well-planned program. The major change required is a shift of emphasis in testing so that retention of previously learned material is remeasured simultaneously with initial measurement of newly acquired material. For example,[1] in a teaching situation based on this kind of organization, the subject matter, general science, Grade VII, is appropriate for cultivating ability to *recall facts,* ability to *explain scientific data,* and ability to *draw conclusions.* The pupils were informed that their learning during the course would stress achievement in these three abilities. Instruction and testing materials were planned with reference to a unit of subject matter for each two-week period during an entire semester of 18 weeks.

At the conclusion of the first two-week period of instruction a test was given to measure the amount of acquisition that had occurred during this period. At the end of the fourth week (the second two-week period) the test consisted of a rearrangement of items which combined those measuring acquisition of the materials of the two-week period just ended and retention of materials studied during the first two-week period. During the remainder of the course a similarly constructed test was given following each unit. At each testing initial acquisition covering the

[1] Word, A. H., and others, Individual difference in retention of general science subject matter in the case of three measurable teaching objectives, *J. Exp. Educ.,* 1938, 7: 24-31.

current unit and retention of the *preceding* unit were measured. To avoid practice effect duplicate items were used when the same materials were tested the second time.

Recall of facts is graphically shown in Fig. 21, in which the average scores on tests of factual recall are cumulatively plotted. The solid line refers to initial acquisition. The scores of reten-

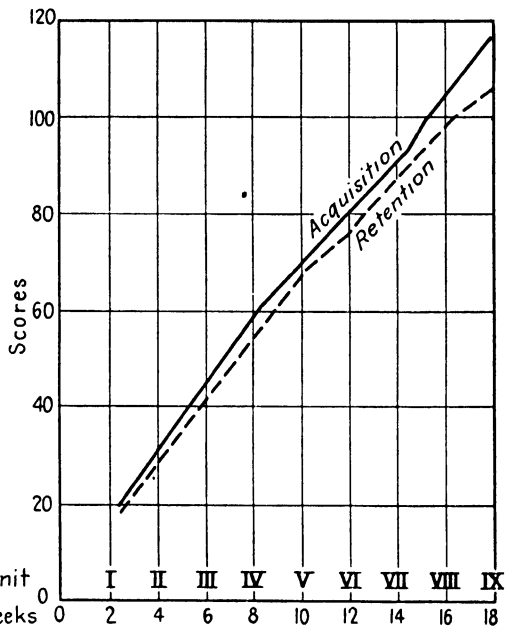


FIG. 21.—Acquisition and retention scores plotted cumulatively (tests measuring ability to recall facts).

tion during consecutive two-week periods following initial acquisition are traced by the broken line.

Regularity in testing newly acquired material contributes to consistent learning throughout the course. Since testing itself is a learning experience initial acquisition is strengthened and reinforced with each successive measurement of retention.

Retention under such conditions is relatively high throughout the 18 weeks. During the course individual retention scores were sometimes higher than those of initial acquisition. The double

testing program apparently enabled all individuals to improve their mastery of learning materials.

Figure 22 compares the cumulative average scores of acquisition and retention of ability to *explain scientific data.* The level of retention is nearly as high throughout as that of initial acquisition. Similarity of the curves in Figs. 21 and 22 suggests that

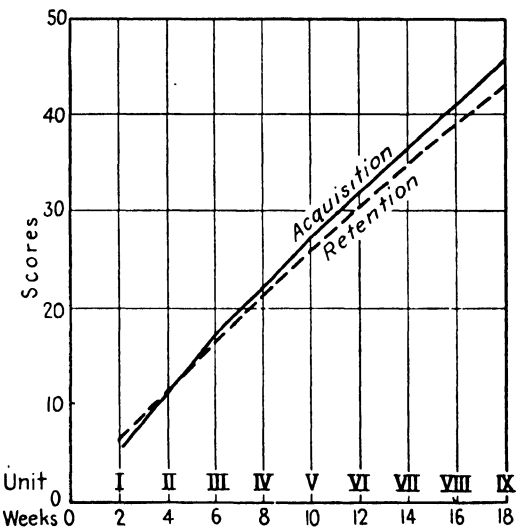


FIG. 22.—Acquisition and retention scores plotted cumulatively (tests measuring ability to explain scientific data).

instruction in the use of facts to explain scientific data strengthens ability to recall. Purposeful instruction tends to increase the correlation between factual recall and ability to explain data. A pupil who is confronted with the problem of explaining scientific data will probably exert special effort to draw upon his fund of factual information.

In Fig. 23 the average scores are plotted cumulatively of tests that are designed to measure ability to *draw conclusions from given data.* In the case of ability to *recall factual information* facts of a given unit may not, without reinforcement, accumulate in excess of those initially mastered. But in case of such higher abilities as that *to draw conclusions,* improvement through

reorganization of material and detection of new meanings may enable many pupils to improve their scores upon subsequent testing. Drawing a conclusion may involve the appearance of truths not previously revealed in the learning situation. The irregularity in the curves may be illustrative of the spontaneity with which new meanings emerge with developing insight. Such

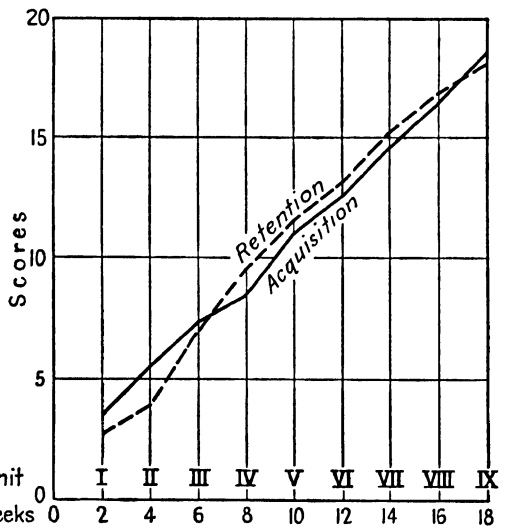


FIG. 23.—Acquisition and retention scores plotted cumulatively (tests measuring ability to draw conclusions).

learning may be characterized by fluctuations indicating emergence of new understanding. The ability to *draw conclusions,* like the ability to *explain data,* is likely to emerge as new materials are organized and correlated with previously learned concepts.

The fact that the tests of the ability to explain scientific data and to draw conclusions contain fewer items than tests of ability to recall makes it difficult to compare the curves as shown in Figs. 21 to 23. There is marked similarity, however, which suggests that the opportunity for continued learning, afforded by the double testing program, stimulates development of all three

abilities. The three abilities appear to reinforce and supplement each other during the course of instruction.

Improvement revealed by subsequent testing may be due in part to integration of material during its progressive development in the textbook as well as to direct cultivation of these three abilities by the teacher. Frequently material that is difficult and obscure at the time of presentation becomes clarified when related to subsequent facts and principles. Most courses include opportunities for review and for dealing with recurring concepts in varied situations. Repetition of materials in testing appears to make a definite contribution to learning.

Measuring Retention after Varying Intervals of Time

In addition to important relationships between acquisition and retention during a course of instruction, certain observations may be made concerning retention at the *end* of a course as compared with the acquisition *during* the course. Use of an examination [2] consisting of all test items presented in the second measurement of learning throughout a course makes it possible to determine the amount retained for varying intervals from the beginning of a course to its completion.

The average scores made on the different units represented by tests administered as the final examination are shown on the broken line in Fig. 24. This figure shows the unit of material to which the scores refer and also the different intervals of time between completion of each such unit and the final examination. The data used are based on tests of *ability to recall.* The solid line connects the average scores of tests given as each unit is completed. Thus it is possible to compare the degree of retention during intervals ranging from 5 days to 16 weeks with initial acquisition. The retention measured for 5 days is that of the material of unit IX, which was the most recent unit studied pre-

[2] Use of identical items as one test at the end of a course is not to be regarded as a typical final examination.

ceding the final examination. The retention for 16 weeks extends to the time at which a test of initial acquisition was given on unit I.

High initial acquisition and retention scores on some units and low scores on others reflect to a large extent the varying difficulty of material in the course. Unusually low scores are made, for

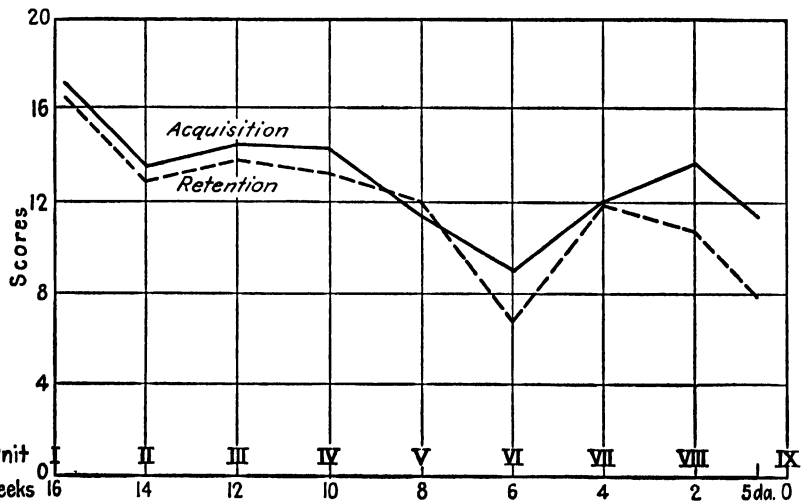


FIG. 24.—Retention scores over intervals ranging from 5 days to 16 weeks compared with initial acquisition scores on tests measuring ability to recall facts.

example, on unit VI. This unit consists of a section in the textbook that presents various formulas, equations, and technical information. Its materials are less adaptable than those of other units to organization that might facilitate learning. Relatively high scores may be observed for unit I, which occurs farthest in point of time from the final examination. The retention curve conforms closely to that of initial acquisition. This finding supports the belief that thorough learning at any time is followed by good retention.

The retention scores shown in Fig. 24 should be compared with those of initial acquisition upon corresponding units. For a given unit it may be observed whether pupils make higher or lower

retention scores than initial acquisition scores. The comparison shows gain in retention for one unit and loss in varying amounts for others. The marked loss in the case of the last two units is probably due to the proximity of this material to the end of the course and to lack of opportunity for its thorough assimilation. The losses in units studied at short intervals of time preceding the final examination are fully as great as those in units studied during the early part of the course and even greater in the last unit. The extent of loss is not influenced by the length of the time interval. No definite relationship is found between the amount retained and the recency of instruction over the material.

The double testing program is an important influence affecting the degree of acquisition as well as the amount of retention for varying time intervals. The testing program itself is a significant aspect of the instruction that the pupils received. Even though some pupils may have studied little, frequency of testing undoubtedly resulted in considerable learning.

Retention and the Final Examination

If a pupil's effort to learn and to retain does not warrant expectancy of satisfactory achievement upon the final examination, early investigation should be made of the difficulty. The final examination is unquestionably significant as a means by which the extent of a pupil's retention may be measured upon completion of a course of instruction. Yet the information revealed by the final examination is obtained at a time when no effective measures may be taken to improve the degree of such retention.

Measurement of acquisition and retention throughout a course yields information by which the degree of retention revealed by the final examination may be predicted. When average *initial* acquisition scores are totaled and such totals compared with average scores made on duplicate tests given as a final examination, a high degree of correspondence in results is found. Pupils who display satisfactory performance throughout a course usually make acceptable scores on the final examination.

When the scores on tests measuring retention at intervals of two weeks are totaled and compared with the scores made upon a second use of the *same* test, administered at one time as a final examination, the agreement is even closer. When a pupil has demonstrated ability to retain knowledge for even a short time, he may be expected to do well on the final.

In a more typical situation [3] than that described, we may expect the additional procedure, such as use of test results for instruction, to assure good acquisition and retention. Material found not to be well learned should be reemphasized before retesting. Effort to assist pupils should be made upon the earliest evidence that they are experiencing difficulties. Good initial performance in a course is a prerequisite to ultimate success. If effective learning has once taken place, it will be well retained.

Recognition of learning as a process of growth during which elements of learning material should expand throughout a course instead of accumulating in unrelated form is an essential concept for teaching. When systematic relationship is maintained between successive units of material by testing the learning that results from the material of each unit in conjunction with the material of preceding units, we may be confident of assuring good learning. Learning thus conceived is directed through an orderly sequential program. Frequent reviews, early discovery and correction of difficulties, consistent search for evidence of

[3] The study analyzed in this chapter should not be regarded as an ideal teaching situation. Its principal merit lies in the fact that the teacher purposely stressed attainment in the three abilities named and measured *acquisition* and *retention* (for short intervals) throughout the course. Its limitations grow out of the stress placed upon the small, artificially determined units and failure to measure retention further back than in the single preceding unit covering a two-week period at the time of each testing. It would be advantageous to measure at each testing period all important concepts that have been treated up to that time in order to ensure maximum integration of knowledge. Final examinations normally should measure only the major points covered in a completed course.

progress, and continued effort to correlate elements of learning material all contribute to successful results.

The early stages of a course constitute the appropriate time for intensive effort that sets the pattern for proper assimilation of subject matter. Little can be accomplished toward the end of a course to compensate for deficiencies in learning during its early stages. Haphazard accumulation of information, as often manifested in frantic last-minute review and cramming, is unlikely to result in well-integrated knowledge.

Appraising the Learner's Progress

Testing may be expected to yield desired evidence concerning the extent to which abilities sought as teaching aims have been developed. Yet, after evidence has been secured of the extent of progress in attaining desirable abilities, there is a certain futility in attempting to express net growth in terms of single total scores. It is inconsistent with knowledge of pupil differences to coach pupils to surmount barriers set at arbitrary heights for all individuals. It is likewise illogical to possess valid information on the varied types of development involved in an individual's growth and to insist that this information be compressed into a single school mark. Simplifying the results defeats the purpose of testing to understand the individual.

If the purpose were to establish criteria for promotion, graduation, or honors, then composite scores might be readily derived from data accumulated during a course. For practical purposes, one arbitrary formula for calculating such scores is as justifiable as another. Letter grades assigned should, however, reflect a true picture of attainment by including consideration of all emphasized teaching aims. Various techniques are available for translating numerical scores into letter marks. One, for example, is based on the calculated standard deviation of the array of composite scores. It must be recognized that teachers and administrators find the ranking problem simplified by having one definite symbol by which to describe the pupil's attainment.

The real problem involved in the use of test results is that of making them meaningful to teachers who are to deal further with the same pupils, to supervisors who are concerned with curricular and instructional modifications, and to guidance staff members who wish the complete picture. Test results should also be in such form that the pupil may be encouraged to think of his improvement in terms of himself. They should differentiate various aspects of his attainment with respect to quality as well as quantity.

Although results of testing are most helpful when they describe a pupil's behavior analytically, it is equally important that they be so expressed as to reveal the kinds of difficulty he is experiencing and suggest the means necessary for improvement. The results of testing should be summarized into a meaningful pattern or into a clear verbal interpretation. In such a total picture may be assembled test results indicative of specific disabilities such as weakness in numerical or verbal concepts or limited ability to make practical applications of facts. The description may include evidence relating to exceptional ability in interpreting facts or drawing conclusions. In general, such a record will include reference to progress in various abilities which a given subject may most appropriately cultivate and may also contribute information concerning interests, attitudes, and other informally obtained evidence of improvement. The diffuseness of analytic treatment of test results should be avoided by planning for their organization into a unified pattern of interpretation.

Frutchey [4] points out that the undesirable effects of marking systems have resulted in the discontinuance of tests in some schools for purposes of marking and in increased emphasis on encouragement of pupils to appraise their own progress. He says:

These schools are discouraging the use of a single mark of achievement. They are developing patterns of achievement appropriate for

[4] FRUTCHEY, F. P., Evaluating chemistry instruction, *Educ. Res. Bull.*, 1937, 16: 1-6, 28.

individual students. A more analytical and descriptive evaluation distributed through the year is being used so that the evidence of growth or lack of growth may be obtained periodically, and helpful experiences may be provided before they complete the course.

The problem of appraisal remains in the experimental stage. It may be expected to consist of carefully designed cumulative records, which will provide for charting individual progress in *many* desirable abilities, not simply for entering *one* mark at the end of each month or at the end of a course, this mark constituting a composite picture of attainment.

Further research is needed concerning the nature of abilities beyond the memorization level. But we are justified in believing that a time will come when the entire school organization will participate in common effort during the school years to develop certain higher abilities which are cultivated only incidentally in the traditional school. Although subject-matter fields may continue to be compartmentalized, similarities among abilities in several fields may lead to a scientifically constructed pattern of abilities, to be cultivated continuously during the entire school period. So far as content and factual information are concerned, subject-matter fields may remain in a state of specialization. But upon representatives of all fields will be imposed the obligation to strive toward attainment in a number of common aims, and progress in such attainment will be included as part of the individual pupil's record. Some aims may be attained in many fields, whereas others may be attained only in a few related fields.

A closer relationship between testing and curriculum planning may be expected when the program of instruction is supported by concerted effort of the school organization to foster abilities of higher order than that of accumulating the factual content of textbooks. With the establishment of a program based upon unified effort toward a variety of objectives, testing may come of age in determining the extent to which various curricular offer-

ings serve to cultivate selected abilities. The results of tests may indicate those parts of a curriculum which are less effective than others in fostering attainment of such aims. They also may clarify their meaning and the extent to which they may be cultivated.

One result of traditional teaching, testing, and interpreting test results has been to increase the number of subject-matter fields, perhaps to a greater extent than training in the art of thinking requires. Our conventional plan forces us to think in terms of subject-matter fields, since it stresses attainment almost exclusively in terms of facts.

Closely related fields may be expected to become more highly integrated and current curricular practices show a trend in that direction. Investigation of retention of subject matter over a period of years following graduation should influence the organization and use of learning material. Much stress is at present given to unnecessary short-lived facts, many of which if forgotten may be readily relearned when needed. Such stress is frequently at the expense of far-reaching mental abilities and habits that persist.

It is often difficult for the community to understand the significance of progress in education, since thought patterns of adults tend to become crystallized in terms of their own school experiences. Mature people may overlook the adjustments that they had to make from school to life and must be shown that schools are attempting to bridge the gap more efficiently.

Many educators would like to make progress more rapidly than the lag in parent opinion permits. Unreceptiveness of parents to educational innovations is frequently a result of failure of the school to clarify its philosophy and method.

Interpretation of what the school is doing is usually a carefully planned activity of modern administration. Parent-teacher groups are used for the development of better mutual understanding. Brief bulletins are given pupils to take home from time to time as administrative details are changed and new ones

put into operation. The pupils themselves are carefully informed of the viewpoints that the school is taking, since the community learns much about the schools from the pupils.

A principal objective of the school is to improve learning. Hence interpretation to the community of such a program should stress three purposes: (1) that the classroom is attempting to emphasize attainment that will not only be meaningful but will persist over long periods of time, (2) that testing is directed primarily toward determining the needs and cultivating various abilities of the individual, and (3) that teaching and testing are concerned with something more helpful than finding out how a pupil compares with the group. Bringing each individual up to the level of his potential abilities is more important.

PROBLEMS FOR DISCUSSION

1. Comment upon the statement: "Every evidence of learning is a test of some kind, and every result of testing is evidence of learning."
2. Comment on the statement: "One cannot have one philosophy of learning and another of testing."
3. Give evidence from your own experience in support of belief that acquisition and forgetting occur simultaneously. What bearing should this viewpoint have upon teaching procedures? Upon testing procedures?
4. Give evidence from your own experience of qualitative and quantitative changes that occur while learning is in progress. Discuss the limitations of drill in effecting such changes.
5. Discuss certain advantages to be derived from continuing to test retention related to earlier learning materials while measuring learning of recent materials.
6. Formulate your views on the proper balance between excessive and insufficient guidance. Comment on the statement that a pupil "learns what he does."

7. Why are certain gains of learning characterized as intangible? How would you differentiate them from gains represented by such skills as reading and writing?
8. To what extent do you think it characteristic of the typical pupil to coordinate and organize his learning materials?
9. Propose an outline for a report card which will analyze a pupil's achievement more fully than a report of single marks for each subject.
10. Discuss briefly the problem of interpreting pupil achievement to a community.
11. Discuss the statement that conventional numerical or letter marks are more suggestive of pupil differences in learning efficiency than of the character of a pupil's effort or achievement. To what extent may such marks provide inadequate and misleading information concerning learning?
12. To what extent would you agree that objective measurement of scholastic achievement may offer less encouragement to good learning than subjective evaluation? Can we really measure learning in the true sense?

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CHAPTER X

Maintaining the Gains of Learning

Many pupils regard completion of a course of instruction as the ultimate goal of attainment. Often they do not project into the future the results of their immediate accomplishment or foresee the long-range possibilities of their learning. The finality implicit in tests and examinations tends to encourage this point of view.

In the classroom, however, the primary purpose in requiring mastery of learning material is associated with its future usefulness and applicability. Facts mastered and abilities developed have a point of reference far beyond the completion of a course of instruction. Formal testing during a course of instruction is concerned in the main with the immediate results of learning. A fundamental reason for examining such gains is to obtain clues concerning the extent to which pupils may retain the abilities developed. From this point of view a final examination acquires significance not only as a measure of accomplishment at the end of a course but also as an index of the length of time such accomplishment will be maintained.

Evidence of Retention

Permanent results of learning are best understood by the types of performance possible at a later time. In determining the

permanence of learning during intervals of time following instruction, three types of evidence may be sought. First, desired types of response may be relearned, and retention measured on the basis of time or repetitions required to restore initial performance. Second, responses may be reinstated or reenacted upon display of cues that initially elicited the responses. In this case, test items suggest but do not state the responses desired. Third, responses may be selected as appropriate to the original material, without active reinstatement. Test items inviting recognition include a correct *response*. These three kinds of evidence form a basis for measuring the degree of retention and constitute, respectively, the *relearning*, the *recall*, and the *recognition* methods.

Methods of Measurement

The relearning method is typically a technique of the psychological laboratory where it is frequently used with nonsense syllables and other meaningless material. If one is able to relearn quickly, the forgetting of some material may not be a handicap. Relearning occurs more readily than initial learning. Thus the fact that one has once learned something tends to enable him to relearn it with less time and effort. Emphasis will be given to the methods frequently used in schools: recall and recognition, some aspects of which were discussed in Chap. VII.

Recall Method. Recall of pertinent information has long been favored by teachers as a basis for examinations. After a period of instruction and study, recall tests are administered for the purpose of gauging the quantity and quality of material that the learner can reproduce. The typical techniques of this method are those of *unaided* recall and *aided* recall.

In the case of unaided recall the pupil makes his responses almost spontaneously. A subject may be written upon the blackboard or on paper, or be communicated orally to the pupil, who is required to state everything that he considers pertinent to the topic. By reproducing all he can of the information which response to the subject suggests, the pupil reveals his learning ex-

tensively in terms of quantity and quality. Evaluation of the results of his effort establishes a basis for estimating the extent to which he can recall facts and make other uses of information at his command.

When the method of unaided recall takes the form of an essay examination, there are limitations in the fact that only a few questions may be asked and wide sampling is not possible. The inherent advantage of being able to require spontaneity of recall in wide areas of knowledge and to specify the kind of organization measured offsets, however, the disadvantages of restricted or undirected sampling. As a measure of retention, unaided recall may reveal qualitative and quantitative aspects of learning with greater fidelity than any method of aided recall.

In aided recall the learner acts upon relatively specific cues which narrow the limits within which his responses will be correct. Only within specified areas is his reproduction of facts and information spontaneous. Recall with the aid of cues is severely restricted when simple objective items providing blanks to be filled are used, these blanks usually occurring near the end of statements. The item "Columbus discovered America in ——" permits no optional modes of response.

Because the method of aided recall used in the short answer item restricts areas of pertinent responses, it tends to overemphasize memorization of facts to the neglect of relationships and applications. Wide sampling of material is possible, but a high score is indicative of accumulation of a diversity of facts rather than the ability to reproduce them with little aid from cues. The teacher will usually find aided recall items most useful in constructing short answer tests to determine whether pupils have observed textbook assignments or have read required supplementary material. It would be impossible without specific study to obtain high scores on tests containing such items.

Recognition Method. Instead of requiring pupils to reproduce various aspects of learning material spontaneously or with the aid of cues as in the case of recall, the recognition method meas-

ures retention by determining the extent to which the learner can identify proposed responses as correct in the situations provided. Tests of recognition use various arrangements of material such as true-false statements, multiple choice, best answer responses, and the matching exercise.

A modified form of the recognition test involves the technique of reconstruction. It presents to the learner a series of items in disarranged sequence and requires him to rearrange them in correct order. It may present sentences in which he is expected to reconstruct with alteration, such as correct capitalization and punctuation. It may also be particularly useful in measuring retention of any form of learning in which motor responses predominate, such as in trades and industries. Parts of mechanical devices may serve as testing material and the learner be required to reenact the process of assembly. In such testing of motor skills the principal merit of the technique lies in its rigid requirement that the learner check his progress at each stage of learning. If his knowledge is superficial, he discovers this fact immediately.

Principally because of objective methods of scoring, recognition tests have been popular. Belief is sometimes expressed that provision of optional responses reduces emphasis upon recall of facts and stresses reasoning and reflective thinking, but this point of view has not been experimentally substantiated.

It is probable that the amount of mental activity involved in effort during a recognition test has been greatly underestimated. When one *recognizes* in response to recognition items, a substantial part of his mental activity is that of recalling information by which to confirm a conclusion. In the case of a true-false item, the individual is expected to evaluate a statement according to his background of information. It is doubtless erroneous to suppose that he responds to a proposition without reference to mental context. He may be unable, however, to recall sufficient facts and thus be tempted to guess.

Other forms of recognition such as the multiple-choice item

provide opportunity for one correct as well as several incorrect responses. The purpose of this device is to cause the learner to discriminate among various answers suggested, and by his selection to reveal the adequacy of his background of facts. In all cases recognition items draw upon one's store of information through aided recall. But since such recall of information requires the rejection of false proposals as well as the acceptance of correct ones, the learner actually recalls much information that is not pertinent to the problem and only a small amount that bears upon the response he selects.

He may recall facts that he cannot recognize. He may also recognize many facts that he cannot recall. This does not mean that recall and recognition are distinct psychological functions. The varied results of recall and recognition methods are partly due to the nature of the individual's initial responses to learning materials. The method of measurement does not necessarily determine the manner in which an individual actually thinks in answering recall or recognition items. Neither does it show the manner in which the material was initially learned. Recognition items may be designed to reveal mastery of large quantities of facts or require conclusions involving complex mental activity.

Recall of material imposes the more severe test upon a learner since he must reconstruct or reformulate his responses. He is obliged to depend to a greater extent upon his own knowledge, and his initial learning must sink deeper roots into his retentive processes in order that varied types of cue may elicit desired information. If permitted, he may make a more adequate response to recall items; the recognition item may not encourage him to do so. Much of the information that may be obtained from an individual only by use of recognition items he may be unable to describe. His response may thus serve only to indicate that during his learning experience he has had contact with such information. For purposes of measuring both the quality and the quantity of retention the recall method is more effective.

Gain and Loss under Varying Conditions

Retention studies may be classified under two broad categories: (1) retention in a subject while the learner continues its formal study and (2) retention of subject matter while the learner is no longer engaged in such study. Under the first classification pupils, for example, no longer receive specific instruction in basic skills in arithmetic but are stimulated to refresh their familiarity with such skills by the demands of comprehensive courses in mathematics during later school grades.

Under the second classification there is little or no stimulation to continue or revive learning. Many studies of retention under such conditions deal with individuals who are no longer in contact with the same or related fields or who are subjected to different influences during summer vacation. We shall deal first with retention in the case of learners who remain under the influence of their fields of study.

Retention While Continuing Study of a Field

As adults we take for granted our command of information in various types of subject matter and seldom recall the circumstances under which it was initially acquired. During the school years, unexpected conditions likewise necessitate frequent reinstatement of earlier learning with the result that each time its use is required, it is further fortified against loss. This influence is especially significant when a sequence of courses in related subjects continues during an extended period of time. Much of the learning that ultimately appears may be attributed to the strengthening that has followed the initial learning experience.

Since such fortification of learning occurs as a result of need as well as specific instruction or review, it will be helpful to an understanding of retention to study progress of typical pupils while the rapidity of their forgetting is thus checked. Progress was examined in the measurement of acquisition and retention of 56 pupils for a period of 20 months, during which they con-

tinued study in arithmetic. During this time their abilities in that subject were tested periodically on the same standardized test.[1] The purpose was to determine the extent to which pupils retain certain basic skills while studying increasingly complex material in arithmetic and thus acquiring new related knowledge. The basic skills measured are those initially acquired previous to measurement of their retention during Grades VII and VIII.

Throughout the 20-month period pupils reviewed fundamental operations by use of timed tests, 10 and 20 minutes in length, provided by the textbook. No additional effort was made to keep such abilities alive. Pupils continued to study arithmetic during Grades VII and VIII and were not informed that they would be given tests periodically on material that they had first studied during their early elementary-school grades and had practiced during a greater part of Grade VII. Testing was repeated at intervals of approximately 4 months. The same tests (A and B forms rotated) were administered during the 20-month period.

1. *Progress in Arithmetic during a Twenty-month Period.* The results shown in Fig. 25 are based upon scores obtained upon the six sections of the standardized test. The arithmetical skills measured are those of addition, subtraction, multiplication, division, fractions (including decimals and percentage), and problems (general list). The scores shown are the median (charted as Q_2) and the upper and lower quartile points (Q_1 and Q_3). Such scores are connected by solid lines in order to trace the results of testing during the total period. Vertical broken lines indicate the range of scores obtained upon different sections of the test.

Although pupils tend to demonstrate increased power with each testing period, some aspects of arithmetic show greater improvement than others. Scores in subtraction, for example, level off at the third testing, multiplication at the fourth, whereas those of division, fractions, and problems increase with intermittent

[1] Schorling, Clark, Potter Arithmetic Test, World Book Company, Yonkers, N. Y.

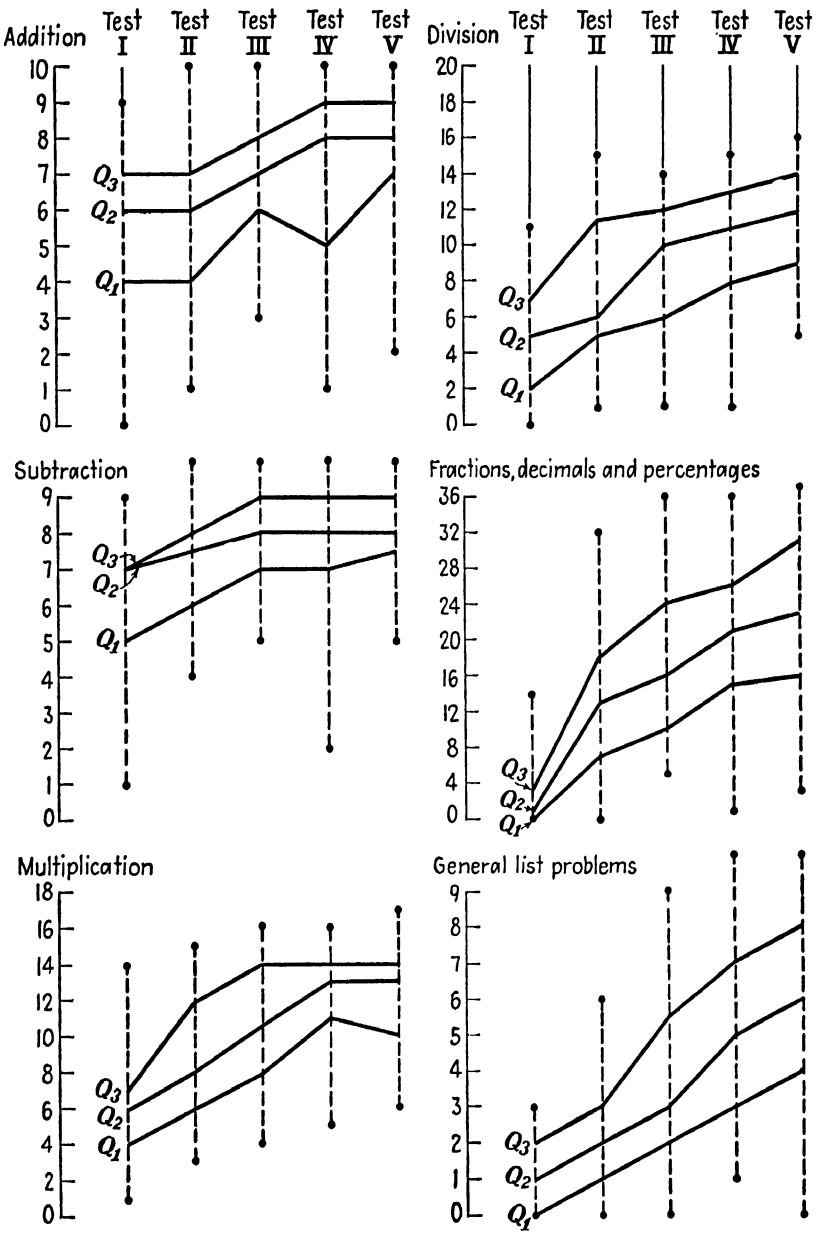


FIG. 25.—Progress in separate aspects of arithmetic in terms of medians, quartiles, and ranges.

fluctuations throughout the testing program. Such variations in efficiency not only reflect operational difficulty of the processes but may also result from the varying opportunity for their use in arithmetic in Grades VII and VIII. The results suggest that we cannot assume that abilities once demonstrated will remain at the same height of efficiency even during a comparatively short period of 4 months.

2. *Recovery of Abilities during a Twenty-month Period.* We may examine the processes of acquisition and retention from a further point of view by calculating, for problems and exercises incorrectly worked at a given testing, the percentage that pupils worked correctly or regained upon each subsequent testing period. The purpose is to analyze the conditions under which, during an extended period of study, losses with subsequent recovery occur.

Figure 26 presents the percentage of operations under the different sections of the test, as well as of the whole test, which pupils performed *correctly* upon the first testing, performed *incorrectly* on the second, but performed *correctly* on at least one of the remaining testing periods. Each recovery is credited to the particular testing period at which it was first made. On the section dealing with addition, for example, the exercises that were correct on the first testing and incorrect on the second were selected for special study during the remaining testing period. Of this group of exercises 82.5 per cent were correct on the third testing, 8.8 per cent were not regained until the fourth testing, and 2.9 per cent not until the fifth. The pupils eventually regained a total of 94.2 per cent. Thus the loss in addition was 5.8 per cent at the conclusion of the testing program.

A similar situation is shown in Fig. 27, in which the exercises and problems correct on the second testing but incorrect on the third are studied with respect to success made on the fourth and fifth testing periods. The pupils regained a total of 84.4 per cent of this group but failed to recover 15.6 per cent. It should be

noted, however, that they had one less testing period on which to demonstrate relearning.

Of the problems and exercises *correct* on the third testing but *incorrect* on the fourth, the total recovery for all types of opera-

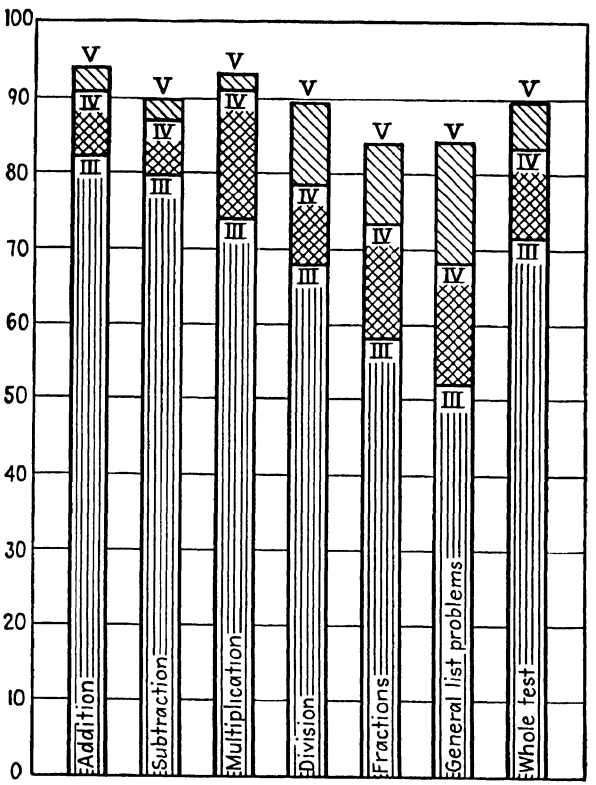


FIG. 26.—Percentage of problems or exercises (correct on first testing and incorrect on the second) regained during subsequent testing.

tion was 65.3 per cent. The fifth testing period was the only remaining opportunity for demonstrating recovery. Addition showed the highest recovery, 74.4 per cent, and general-list problems the lowest, 57.4 per cent.

Several significant facts are to be noted. Recovery is in each case greater on the testing *next following* those on which incorrect responses were made than recovery made later. In other

words, if a pupil works an exercise correctly on one testing period, misses it on the second, he is more likely to work it correctly on the third testing in the series than on any that follow.

Partial explanation may be seen in the selective effect of the

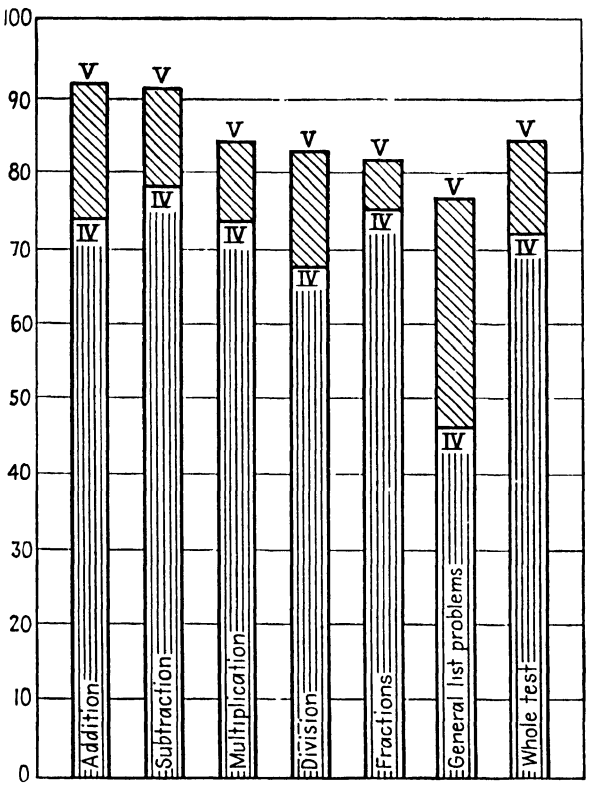


FIG. 27.—Percentage of problems or exercises (correct on second testing and incorrect on the third) regained during subsequent testing.

demand for particular arithmetical skills. Relearning is stimulated to a high degree but not completely. A majority of the skills appear to be required somewhat consistently throughout Grades VII and VIII. Pupils have little opportunity to forget operations required during their advanced work and retrieve a major portion of their losses immediately.

It is possible that the tendency to recover early is also due in

part to the varied emphasis of instruction between Grades VII and VIII. Although it was not assumed that pupils in Grade VII retained thorough mastery of the skills taught during the elementary-school years, much of the actual review during Grade VII was incidental. Yet, the instruction of Grade VII presumably began with material on a level of difficulty appropriate to the average ability of the entering group of pupils. Its materials were more closely integrated at that time than later with those of earlier instruction. During the latter part of Grade VII and throughout Grade VIII, increased stress was given to practical everyday problems. In order to ensure overlearning of basic skills, initial instruction often emphasizes more difficult types of manipulation than those used thereafter. It is probable, therefore, that certain skills may not have been highly essential for success during Grades VII and VIII.

General-list problems show least recovery on subsequent testings. Such low recovery may be attributed to the fact that no specific formula is applicable throughout the varied types of problem. A basic skill appears somewhat more susceptible to relearning. Skills requiring higher abilities are less readily learned and relearned, especially during short intervals of time.

The facts suggest the need for integration between courses on various grade levels in order that there may be opportunity through continued use for spontaneous revival of previous learning. Continued study in a field of subject matter will cause learning to be retained to the extent that it draws upon important facts and principles and presents new topics and problems in an orderly arrangement with reference to recurring concepts. It is clear that need and use are important factors in keeping learning alive.

Retention Following Completion of Subjects

A problem of major concern to pupils and teachers is that of the ultimate effect of learning. Because of the time and effort expended in learning and teaching, the permanency of the values

that are created is a relevant topic. No theoretical argument is necessary to establish the fact that, unless acquired materials are continuously used, they inevitably suffer some loss. In our present discussion we are concerned with what becomes of learning in the absence of specific experiences from which it was initially derived.

Retention Curve. For types of mastery measured in a majority of experimental studies of retention following cessation of specific instruction, it has been established that forgetting takes place rapidly upon early measurement but that the decline becomes increasingly gradual until the curve is practically level. The rate of decline varies in the case of different school subjects. Other conditions also affect the rate. Consequently, it is possible only to suggest its frequent characteristics.

Almost all retention studies have used measuring instruments of the conventional type, recall or recognition, with a high degree of emphasis on retention of factual information. Our knowledge of retention would be more complete if further inquiry were made to determine which aspects of various subject matter are best retained. We also need further data on the permanency of higher abilities, which investigations thus far suggest is high. Relatively few studies have dealt intensively with permanence of attitudes, problem solving, ability to explain or infer, or ability to obtain information. Most studies of retention cover short periods of time.

Figure 28 [2] shows the approximate shape of the curves that are often derived from studies of retention in the case of school subjects. In these particular curves the initial decline is unusually abrupt. But, instead of accepting the initial decline as evidence of inherent futility in classroom instruction, we should examine the conditions under which retention is studied.

The decline refers principally to ability to recall specific facts.

[2] SPENCER, E. M., The retention of orally presented materials, *J. Educ. Psychol.*, 1941, 32: 641-655.

The pupil's retention is measured in terms of what he knew at the end of a course and at various times thereafter. His gains[8] at the end of a course are compared with what he knew at a later date. We measure how well he is able to reproduce what he knew initially. We do not determine what he may have done with his material in the interval of time between initial measurement and remeasurement. We cannot determine whether he has been able to derive important meaning from his learning, use it for a gainful purpose, assimilate it, or mentally practice it. It would be equally difficult, for example, to evaluate completely the net worth of intellectual achievement during school or college. Consequently, when testing reveals that a high percentage of a pupil's initial learning is forgotten within a short time, all we can conclude is that he is less proficient in satisfying comparable test requirements. It is more difficult to evaluate what he has retained or gained in the form of abilities that are not revealed by the possession of information.

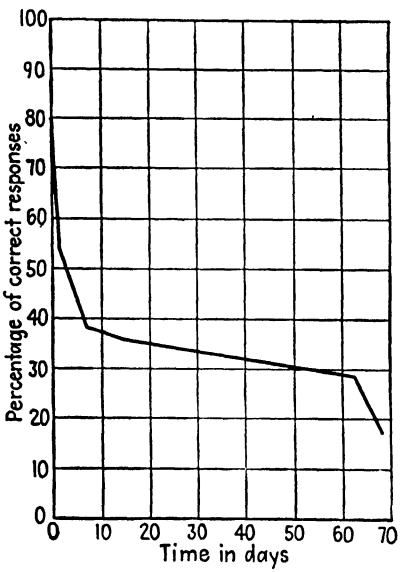


FIG. 28.—Curve of retention. (*After Spencer*, 1941.)

It may be inferred that retention in the case of types of learn-

[8] Scores obtained upon a final examination are often used to represent approximately the gain made during a course of instruction. A more refined technique of measurement provides for an examination at the beginning of a course. The difference between scores made on such an examination and the final examination constitutes the gain actually made during the period of instruction and rules out the knowledge that pupils may possess at the beginning of the period.

ing other than factual mastery does not follow a conventional curve of decline. Available evidence favors the point of view that it does not do so. Instead, many results of learning persist with slight loss during long periods. Those who appraise the outcomes of education by strictly utilitarian standards and deplore the inevitable loss of unused facts and information may find comfort in the fact that certain significant aspects of learning persist undiminished throughout long periods of time. Such learning, however, is never achieved without wise use of learning materials. Acquisition of facts and their retention may be considered only a partial goal in teaching.

It is highly significant that ability to apply principles and the ability to draw inferences should be characterized by a relatively high degree of permanence as compared with the length of time during which factual information is remembered. Such permanence appears to indicate significant gains in mental growth.

According to Tyler, there is greater retention of abilities that are superficially stressed in the classroom than of ability to recall informational content. In his study, 68 ninth-grade pupils, who had completed eighth-grade general science during the preceding June, were retested in September and again after 8 months. The abilities tested were (1) ability to recall or recognize factual information, (2) ability to explain everyday scientific phenomena, and (3) ability to generalize from given data. A standardized test stressing factual information, in duplicate form, was used to measure the first ability. Specially designed tests were administered to measure the second and third. The results are summarized in Table VI.

The results strongly suggest that in the case of the subject matter concerned its permanent values are incompletely revealed in the measurement of the ability to recall factual information, and that the typical range-of-information test inadequately determines the extent to which instruction fosters mental growth. The implication is clear that higher abilities constitute aspects of mental growth that have enduring value.

TABLE VI.—AVERAGE SCORES ON INITIAL AND FINAL TESTS ADMINISTERED TO MEASURE RETENTION IN THREE TYPES OF ABILITY *

Test	Mean initial score	Mean final score	Mean loss, 8 months	Percentage of loss
Factual	27.9	16.8	11.1	39.78
Explanations	23.4	21.6	1.8	7.69
Generalizations	21.7	20.5	1.2	5.53

* TYLER, R. W., What high school pupils forget, *Educ. Res. Bull.*, 1930, 9: 490–492.

A further implication for retention is the enhanced value of instructional material when abilities that are cultivated in one subject-matter field may be transferred to other fields. Transfer value does not result directly from accumulation of information but from purposeful training. The results of instruction are manifested not only in the information acquired but also in the patterns of ability that facilitate effective treatment of new learning situations. Transfer of training constitutes an important outcome of growth in abilities of a higher order. Judd [4] summarizes conditions of transfer with respect to the higher mental processes as follows:

In human mental life there are also narrow experiences consisting in the recognition of particular situations in which direct, routine responses are made. Fortunately, there are in human life other and far broader experiences. When the mind analyzes a situation, selects important factors through abstraction, and generalizes by discovering the same important factors in other situations, something is happening which is wholly different from that which is characteristic of the lower forms of conscious experience. At the higher levels, transfer is typical, not exceptional.

If the facts and information are used with an effort to understand and to make applications, higher levels of learning may be

[4] JUDD, C. H., *Education as Cultivation of the Higher Mental Processes*, The Macmillan Company, New York, 1936.

achieved. Gains made in the various subject-matter fields are, in a sense, cumulative on these levels. These higher level gains often constitute the net contribution of many subject-matter fields. Pupils who are taught to deal constructively with facts, beyond the point at which they are able to recall, achieve types of learning in which the curves of retention show slight decline following cessation of formal instruction.

Explanation probably lies in the fact that higher mental processes are frequently practiced during the business of daily life. The detailed facts of chemistry, French, or algebra, for example, are usually not necessary in typical thinking. Most individuals recall or obtain specific facts only as needed, and information thus obtained generally serves the requirements of a relatively complex problem. With increasing maturity, they tend more and more to use facts in association with one another. Everyday thinking is typically complex. Facts that are useful to an individual do not long remain in isolation but are organized into frequently practiced patterns of mental activity—patterns which practically and profitably demonstrate learning on the higher levels. Formulas, facts, etc., may be forgotten but are easily relearned when needed. More important is the fact that the ability to use such data is not forgotten.

Character and Amount of Activity Following Initial Acquisition. Contrary to an apparently valid belief, time is not an essential factor in forgetting. The degree to which learning is retained is conditioned by the kind and amount of activity that occurs during the interval between initial acquisition and the measurement of retention. If the activity in the interval possesses similar or related meaning, initial mastery may be followed not only by good retention but by improvement. If the interpolated activity is irrelevant or conflicting, decline of initial mastery follows. An accountant, for example, is more likely to retain familiarity with ordinary procedures in arithmetic than a musician or a professor of psychology. The explanation that his activities afford opportunity for practice does not explain all factors. An additional

reason is the fact that an accountant's occupation permits fewer opportunities for new or unrelated learning to crowd out the old.

In experimental investigations it has been shown that students who slept during the interval between initial learning and measurement of its retention made higher scores than those who were permitted to engage in irrelevant activity. Forgetting seems not to be due to the "fading of neural impressions" but to the inhibition of the old by the new. The diversity and intensity of living may affect detrimentally retention of specific items of information and yet be favorable to learning from the standpoint of a broadening understanding of life's problems.

A considerable amount of learning that appears to be lost is retained in forms different from those in which initial acquisition occurred. The organization of learned material into large patterns may inhibit its recall in original form. We have already alluded to types of higher mental process which result from thoughtful assimilation of facts. Facts and information are organized and reorganized into larger bodies of experience to an extent that the knowledge initially acquired can be said no longer to exist as such. But in a broad sense the sustained effect of learning may be demonstrable in another form.

Many of us, for example, have forgotten some of the devices that were useful in enabling us to acquire facility in reading. We no longer limp through the pronunciation of words, supporting our steps on arbitrary values for vowels and consonants, but read by a different process. Our initial learning has completely disappeared, and many of us would experience difficulty if without some opportunity for relearning we were required to teach reading to a beginner.

Effect of Summer Vacation. Study of retention during summer vacation has benefited by the relative constancy of the time factor and by the fact that conditions of experimentation are more uniform and subject to control. Interest has also turned toward this type of investigation because the effects of loss are felt upon resumption of school activities following vacation.

Although loss in mastery frequently has been found according to evidence obtained by remeasurement of learning, gains are also noted. The type of subject matter is a significant factor in determining gain or loss. Gains in reading ability often occur. Loss in arithmetic and spelling are typical findings. Gains are also frequently found in social and natural sciences.

During summer vacation, pupils generally follow their own devices in their choice of activities that might favor good retention. Certain spontaneous activities may provide opportunities to continue practice. Reading is the most universal personal interest closely related to school activities. Practice in reading during summer vacation results in improvement which may transfer to numerous school subjects. Improvement in reading comprehension during the summer is associated with gain found in verbal arithmetic problems. On the other hand, loss in ability to perform numerical operations has been frequently noted.

The measurement of net loss following summer vacation is so articulated with factual mastery that we tend to overlook the learning that occurs then as a result of unconscious practice. Crowded learning during a course of instruction often encourages rapid accumulation of facts without sufficient time for reflection. The summer period provides more time for assimilation and continued improvement through reflective thinking. It may also increase the number of daily experiences to which recent learning may be related. There is a unique personal opportunity during summer vacation for a learner to direct his mental activity.

Many of the observations made of retention following varying intervals of time apply with equal force to retention during summer. We should welcome the arrival of summer as an opportunity for variation in personal experiences. From the standpoint of good learning, pauses during the rapid process of acquiring facts and information are desirable, especially if the instructional program is deficient in its provisions for good assimilation and understanding.

Although summer vacation was initially provided for different

reasons, it is fortunately consistent with an educational plan that permits an individual to learn in ways other than through continuous ingestion of facts and information. To require pupils to attend school uninterruptedly throughout an entire year would result in crowding them with a greater abundance of facts and principles. But such a plan might prove uneconomical, since it makes no provision for adequate time to learn with a high degree of understanding. Such an innovation would be desirable only if an equivalent amount of time were provided for more frequent vacations of shorter duration.

Extending the Influence of Instruction

Principles for effectively securing maximum gains during initial learning and for doing so in such a way that these gains will persist during extended periods of time are in many respects complementary. Effort that stimulates good learning will result in good retention. Conversely, when teaching is directed upon attainment of results that may be felt long beyond the completion of courses of instruction, the character of such learning is consistent with its long-term retention. Implicit in these observations is the assumption that relative permanence of learning and emphasis upon maximum values to the learner are outstanding among the principal contributions that instruction makes to the individual.

Making School Experiences Satisfying and Meaningful

Pupils whose learning occurs under conditions in which they derive satisfaction tend to retain their learning over long periods. Under emotionally wholesome conditions in which their effort is recognized and the teacher is cooperative with respect to their personal interests, good learning is encouraged. In an atmosphere in which the inhibitory effects of anxiety, frustration, and fear are eliminated, pupils are encouraged to personalize their learning experiences. Learning that becomes a part of an individual is subject to spontaneous recall and application in both

in and out of school situations. The personality of the teacher is an important factor in stimulating learning that will have enduring effects.

The teacher may do much to make learning satisfying and meaningful by considering the abilities of learners and organizing materials in such a way that all pupils may successfully participate in some type of activity. He should make special effort to relate learning materials to the varied backgrounds of individual pupils. In this way he may strengthen meaningfulness of material and eliminate lack of comprehension as a major source of learning difficulty.

Although the teacher cannot control activities that follow cessation of instruction, he can influence their character through the development of related interests that pupils will subsequently pursue. Interests related to learning materials contribute to many activities. The influence of the classroom continues actively where the subject matter contributes to interests already present, or stimulates the emergence of new ones. Recognition of reading interests constitutes a valuable opportunity to encourage pupils to continue their learning in many fields. Pupils whose courses in science have awakened reading interest are likely to recall many experiences associated with classroom instruction. Those who have been introduced to reading of high quality in courses in English are encouraged to continue good reading and thus to maintain and strengthen their appreciation of literature.

Organizing Learning through Reviews

Review at strategic times during a course of instruction may be used as a means of organizing materials in such a way that learning gains will be maintained. Effectiveness of review depends upon the extent to which it reveals new meaning as a result of organization and provides opportunity for assimilation. Review consisting purely of repetition of the same types of response made during initial acquisition cannot create the broad general outlook needed for retention. When planning a review,

the teacher should ask: "How can this review be made to contribute to the unification of materials of this course and extend the time during which mastery will be retained?" Review should clarify previous learning so that future learning may more readily be associated with it and a continuity of learning be thus assured. Information that has been well organized is better remembered during long periods of time. In the framework of a well-organized course there are abundant clues to assist the individual to recall specific facts.

Review before summer vacation often increases retention during summer. Review preceding a final examination usually serves a similar purpose. Another practice is to devote a short period of time to review at the beginning of the term following summer vacation. Many teachers find that it is a good practice to survey the knowledge that pupils have retained during summer even though courses that ended before vacation were concluded by review and examination. Beginning a course with such an appraisal may be particularly valuable if the material chosen for review is related to requirements for future learning.

Review and other provisions for presenting an over-all view of material are most effective when they occur before masses of detail become unwieldy. Review should properly follow the more or less confused state of learning that sometimes results when materials are still fresh but as yet unassimilated. Review at regular intervals throughout a course is more effective than intensive review after material has been partly forgotten. The best time to assure retention of material is while it remains susceptible to the effects of organization, literally speaking, while it is still at the command of the learner.

Stressing Higher Abilities

Use of high-pressure techniques may cause a learner to accumulate large quantities of specific information. Some teachers are satisfied if a learner can reproduce upon examination the information that the course has provided.

Retention shows a relatively low rate of decline in the case of instructional objectives related to higher levels of thinking. Specific information is at best short-lived, but the period of its usefulness may be extended if made a basis for cultivating abilities of higher order. Instructional plans for making full use of learning materials result in broad patterns or comprehensive frameworks capable of imparting holding power to specific information. By stressing such aims during instruction, the influence of school experiences may be extended throughout relatively long periods of time. The teacher who encourages memorization without understanding and provides few opportunities for the use of information in ways that stimulate thinking is not laying a sound foundation for permanent learning.

Emphasizing General Education

During the era of an outmoded philosophy of education, fear of the birch switch motivated many learners to master material by a learning process that amounted to sheer memorization. Much emphasis was given to learning materials as a means of cultivating mental power. The fact that the subjects of that period frequently possessed low use value, as in the case of Latin and Greek, was of minor importance. During this era, however, emphasis was on relatively restricted fields of subject matter. Under conditions sharply contrasted with the crowded curriculum of today, teaching procedures favored good retention. There was less material, and more was done with it.

A point of view that followed was that the learner should be able to apply a greater part of his learning in meeting the requirements of daily living. Types of subject matter were consequently modified in response to demand for courses possessing greater utilitarian value. Subjects having limited use gradually yielded to those seeking to furnish information appropriate for almost any activity in which the learner might expect to engage.

This point of view is being questioned on the basis of the superficiality of its results. It has not been possible in practice to

anticipate adequately the informational requirements of a learner's educational and vocational ambitions. Since vocational choices during the secondary-school period are unstable, encouragement of early specialization is a dubious practice. Effort to provide for speculative needs has tended to make learning a matter of accumulating large amounts of information. Coverage of extended areas of information appears not only to have lessened initial emphasis upon fundamental skills but to have disrupted the continuity of learning throughout the school years. Business executives continue to complain that the modern boy and girl cannot spell, perform elementary arithmetical operations, or express ideas in clear language. Many course offerings of the secondary school furnish little opportunity for extended practice in such skills. For the most part, good retention cannot be expected from instruction that stresses the learning of a wide variety of imperfectly organized facts.

The present trend is toward retreat from the extreme point of view that the school should attempt to provide specific instruction much beyond emphasis upon fundamental principles in the various subject-matter fields. The belief is gradually taking form that a sound general education is more effective than one which is all things to all learners. In the long run more may be accomplished by reducing emphasis upon specific material presented, dealing more thoroughly with restricted amounts of material, and teaching the learner to adapt himself to new situations. Current beliefs in general education are that fundamental skills, habits in scientific method, abilities in obtaining and using information, attitudes, and appreciations are the important results of schooling. An individual may acquire highly specific information at almost any time during his lifetime if the need is imminent. An important aim in his training should be to familiarize him with the principles involved in finding information and using it effectively. Such training will have greater value at a future time when the individual undertakes to learn what he needs to know.

PROBLEMS FOR DISCUSSION

1. What part may properly planned review play in checking the forgetting involved in all learning?
2. How do you regard the practice of giving pupils a thorough review before the end of the term preceding summer vacation as compared with providing for a review at the beginning of the fall term?
3. To what extent do you agree with the point of view that good learning results in good retention?
4. What implications are suggested by the fact that specific factual information is quickly forgotten but that abilities to apply principles and to interpret data are retained with slight loss during long periods of time?
5. Under what conditions of learning may there be retention even though the pupil can neither recall nor recognize the learning material which he has studied?
6. Discuss retention in relationship to (*a*) length of time during which courses are taken, (*b*) number of subjects taken at a given time, (*c*) frequency of testing during the course of learning, and (*d*) the final comprehensive examination.
7. Evaluate the methods of relearning, recognition, and recall (*a*) as means of measuring acquisition and retention of various abilities and (*b*) in the light of their adaptability to classroom use.
8. How may a teacher's scholarship and interest in a given field affect procedures making for good long-term retention?
9. To what extent does the nature of an individual's activities following instruction affect long-term retention? Are any types of learning affected more than others? If so, suggest an explanation.
10. Criticize the statement: "J. does not remember much about what he learned in school." Under what conditions may it be true or untrue? In the light of your criticism of this state-

ment discuss how conventional retention curves may be misleading.

11. For permanence of learning, how significant are a pupil's (*a*) general interests and (*b*) interest in the subject both during instruction and during the years that follow?
12. You have perhaps been hopeful that your pupils may some day recall you as a teacher who "really taught them something they did not forget." Summarize the most important conditions of learning that you may influence in order to obtain such praise.

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CHAPTER XI

Favorable Conditions for Learning

Our discussion of learning up to this point has centered on two problems. We were concerned first with setting the stage for learning. This initial step dealt with preparing materials for learning, cultivating abilities, devising test situations, and administering the testing program. Our second step was to study descriptive aspects of learning. There we emphasized the concept of learning as organization and reorganization of experience and its total effects as the result of the interaction of acquisition and retention. In brief, our approach has been to establish a plan for learning and to put that plan into operation.

We shall now examine some of the conditions under which learning goes on economically and effectively—conditions that favor good learning. We may establish as a criterion of good learning the mastery of learning materials which leads to maximum mental growth. This aim is reached when the learner benefits fully from every aspect of the potential stimulation provided by learning materials.

In a discussion of learning it is frequently desirable to cite characteristic violations of sound principles as well as opportunities for their application. A teacher may be unaware of the psychological significance of certain classroom practices, many

of which are followed more often as a result of adherence to tradition than of evaluation of their effectiveness. Every reference to practices of dubious merit illustrates a typical opportunity for constructive effort to enrich the value of our activities by applying the principles of learning.

Establishing Meaningful Learning Situations

Establishment of meaningful learning situations requires the development of a plan for learning, stress upon meaning for the learner, and effective relating of wholes and parts.

The Need for a Plan

Foremost among the conditions that contribute to good learning is the establishment of a systematic plan for instruction. Some of the elements in such a plan do not need to be immediately evident to the learner. Others, such as range and kind of learning material and the types of response to be expected, should be so clearly defined that they will serve as an unfailing guide to the learner at every stage of his progress from the first day of a course to its completion. Wherever practicable, he should know from the start the scope of the materials to be covered and the kinds of response that he is to make.

Importance of Meaning

The meaning of each learning task varies with the particular experience of each learner. The learner may be baffled by the occurrence of words with which he has had no experience. His background may lack abundance of generalized truths from which to select those which might be helpful. Words and generalizations of which he has knowledge must furnish the foundation of any significant meaning that he imparts to the learning situation. Meaning is a significant quality which the individual learner imparts.

Concrete objects more effectively suggest meaning to a child

than abstract concepts. During his early years, he works with concrete materials within his immediate environment. As he advances in maturity, symbols are substituted for his concrete experiences and his world becomes more meaningful. Until a child has conception of number in the abstract, numerical computation is possible for him only in terms of objects that are real and tangible. If there is little in a learning situation to identify its elements with something within the learner's experience, his task lacks meaning and he is frustrated in his efforts to assimilate new material.

To ensure meaning demands that we explore the background and experience of the learner and that we determine the practicability of moving from one kind of material to another by keeping in close touch with the learner's progress. The test of meaning is to be found in the ease with which the learner makes progress from one aspect of material to another and the extent to which he can clothe new facts with understanding. Meaningfulness of learning material is a function not only of a learner's experience but also of the extent to which the organization of materials facilitates the learner's construction of new meanings.

Relating Wholes and Parts

The concept of a learning task divided into its separate parts and their relationship to the total picture has important implications for the manner in which material is learned. After the learner has grasped the significance of the total form, he is then ready to consider individual parts and to master details. In the first instance he uses the telescopic approach; in the second, the microscopic. An outline of the total form is the appropriate framework upon which to display unit features of a learning task in their proper relationships.

Facts known in isolation cannot yield full meaning until their role as parts in a total picture is made clear. Yet only in isolation may complete attention be focused upon them. For exam-

ple, we may consider an event in American history, the burning of the White House by the British during the War of 1812. Numerous details are involved in an account of this event, such as the date, the disposition of the opposing military forces, and the effect of the act upon the morale of the American people. Considerable study is necessary in order to bring together the significant aspects of this episode. Nevertheless it is apparent that the full meaning of the event is not clear unless we fit it into a total picture of that war. In this total picture the learner needs to know something of the causes of the war, to be aware of the general trend of military and naval strategy, and to view the succession of political events as a whole.

The problem of how to guide pupils effectively through a mass of facts frequently presents itself to the teacher. Each fact clamors for individual attention. The teacher must point the way to correct relationships and meanings. Every effort should be made to create as tangible and broad an outline as possible even though it must remain incomplete until its elements have been fully developed.

The need for the presentation of an over-all picture should be anticipated as far as possible in the organization of material. In approaching the divisions of material within a course of instruction, additional over-all previews should be planned and various areas designated for intensive treatment. The aim of the preview is to establish a pattern and to familiarize the learner with the landmarks of his task. When dealing with facts separately, pupils must be encouraged to refer such facts back to the larger introductory patterns. Broad patterns chart the way to an understanding of minute details. These details are continuously referred back to the broad patterns preceding them in order to clarify their own meaning and to contribute increased understanding to the initial pattern. Ultimately the whole and its parts should come to possess totality as well as interdependency of meaning.

Making Practice Effective

The problem that concerns us is not so much a matter of the amount of practice as it is the *kind* of practice and the *manner* in which it is distributed.

Our notions of learning can be easily influenced by the techniques used to study the effects of practice in experimental laboratory situations. In the laboratory the learner is usually required to respond to a constant verbal or motor task, and his efficiency is measured by such objective criteria as time, trials, and errors. With continued practice, the individual becomes increasingly proficient until his task may be regarded as mastered. Learning is thus revealed as more and more of the same kinds of response, rate and accuracy being the primary determiners of efficiency.

One can readily see the usefulness of such a technique in determining rapidity and accuracy with which words in spelling can be mastered to errorless reproduction, the number of arithmetical examples that can be solved within a given time, or the rapidity and accuracy with which the essential content of a reading assignment can be reproduced. As a technique to stimulate speed and accuracy in learning, simple skills in arithmetic, spelling, and reading, there is ample opportunity for its use. Teachers, however, even though they may do so, rarely use this technique either for gauging improvability or for measuring progress.

In the schools we are dealing with a continually changing task in which learning represents growth within large units of closely related material. Instead of a learning task that is constant, the situation is such that the learner is acquiring new units of subject matter and correlating each unit with those preceding. Although the learning situation may be broken down for mastery, there is throughout the course of learning a continuing reference to a body of material. In a continually changing task it is clear that learning cannot be adequately revealed as more and more of the same kinds of performance, with speed and accuracy as

the criteria of efficiency. Instead, classroom learning involves qualitative as well as quantitative kinds of response.

As the learner progresses from unit to unit, he will, if the teaching situation provides favorable opportunity, view his material differently. He will correlate the work of one unit with that of another, frequently recalling related ideas and facts. He will perceive new meanings in previously acquired material, clarify misconceptions, and make new applications. He will also learn to organize his material and to form patterns into which may be assimilated a body of facts. And he will become progressively proficient in acquiring new material on the basis of his experience. The ultimate goal is that the learner has so mastered his material that he is able, regardless of the specific material practiced, to *generalize* it in the solution of problems.

Importance of Varied Responses

Results of studies dealing with the relationship between the learner's performance on one kind of test with another embodying the same material strongly support the conviction that varied responses are necessary for the fullest development of learning. One's proficiency on one kind of test situation may be different from that on another demanding different responses. Practice is effective in producing good learning if it involves seeking new points of reference for given material, making varied applications, or relating facts to each other in an effort to create understanding.

Learning material should also require responses of varied types in the sense that the learner will utilize different ways of expressing himself. He may be asked to state certain facts, write them as during a test, or execute certain types of performance at the blackboard. He may be required to reformulate a textbook statement in his own words, adding interpretation or explanation. He may be asked to name situations in which certain facts are applicable. Problems may be presented in which information in his possession on the memorization level will be called for

and made useful. The learner may also express himself through motor performance by doing something manually in application of his knowledge.

The range and complexity of subject matter in most fields make it important to compare the advantage of thinking about a few basic topics and exhausting their possibilities for learning or pursuing the alternative course of treating a larger number superficially. Opportunities for varied types of response decrease as the amount of material to be covered is increased. The solution of such a problem places upon a teacher a tremendous responsibility, for he must have mastered the materials to such an extent that he knows the learning and teaching possibilities of topics chosen.

In cases in which there are abundant materials there is little time in which to vary the responses sufficiently to assure thorough assimilation and understanding. Under such conditions, teaching effort as well as pupil effort is thinly distributed. When we add to this situation the fact that the organization of the school may encourage rapid coverage of subject matter, we have the inevitable consequence of ineffective teaching and superficial learning.

Importance of Varied Media of Presentation

Written and oral language are the media by which learning materials are most commonly presented. Language, however, is subject to many limitations that may contribute to learning difficulty. No use of words alone can make the construction or operation of a machine as meaningful to a learner as an adequate picture. We can imagine any number of situations which it would be laborious to describe by dealing with them one at a time when only verbal language is used. Even then it would be difficult to present to the learner a unified concept of the situation that he is supposed to master.

Although pictorial presentation may not result in extensive verbal learning, it may contribute much to the learning process

by its particular facility for providing an adequate over-all view. A visual demonstration is less abstract than a teaching effort that attempts to cover the same material solely by the use of either printed or spoken words. It also provides a closer approach to reality and hence is more meaningful to the learner.

Visual devices are especially valuable when the learner cannot visit or explore particular areas of the physical world. They make an important contribution by supplementing the learner's limited experience and background. A visit to an art gallery, the leisurely contemplation of a collection of selected pictures, or scrutiny of a set of stereopticon views permits the learner to advance at his own pace and with full deference to his own particular interests. Graphic materials in his textbook and illustrative sketches on the blackboard enrich and expedite his learning. From the profusely illustrated reading matter of today, there is a wealth of material.

Visual aids are also valuable for renewing and revitalizing important historical events. In such instances pictorial methods enable the learner to view a situation as though he were actually present when it occurred. Dramatic force is applied to the learning process by the feeling of nearness and aliveness which such presentation makes possible. Visual aids result in many ideas which may later clarify textbook explanations. A child may remember the visual impression of the smokestacks of a steamship in pictures that he has seen and later utilize his recollections to attach meaning to the word "funnels" when it appears on the printed page.

Motion pictures, the phonograph, and the radio have vastly increased the flexibility with which ideas may be communicated. They have also vastly increased the number of people to whom ideas may be communicated and the areas in which ideas may be communicated. An advantage of the motion picture is its ability to portray continuous action with fidelity. A major advantage of the phonograph is that recordings may be used whenever desired

and be repeated when needed. The phonograph is especially helpful in teaching foreign languages and music. Radio is most effective when its programs can be synchronized with classroom schedules. Movies with recorded sound tend to be more effective than silent film accompanied by comments from the teacher. Pupils are more strongly attracted by pictorial matter in color. In the study of plant and animal life, use of color makes possible a completely lifelike presentation.

Visual techniques require careful planning and a high degree of ingenuity. For example, when such comparatively simple devices as strip film and slide equipment are used, the instructional material for each presentation should be organized with reference to its maximum learning value. Visual aids should be added to the learning program at strategic intervals. Pupils should be prepared to watch for certain items in advance of their presentation. When visual materials are used, pupils should be held responsible for the information that they provide. Such materials are not of maximum value unless they are closely followed by opportunities for review and discussion. Visual and sound materials should receive appropriate consideration when tests are being planned to measure the results of learning.

Value of Drill

It has long been recognized that repetition has limited value as a learning device. A learner may repeat his performance many times without noticeable increase in efficiency even when he is far from the point of errorless reproduction and still has opportunity to improve. In order that drill may be effective, other factors such as purpose, meaning, and consciousness of error must be associated with it. The significant fact is that drill may provide the learner with opportunity to learn something new about his task each time he practices it. But unless there is some variation in the types of practice involved in drill, its effects may be negligible.

Studies conducted in the psychological laboratory with meaningless material where the number of repetitions required for errorless reproduction is used as a criterion have demonstrated the value of "overlearning" for retention. If it requires 40 repetitions to repeat a list of nonsense syllables once without error, 20 additional repetitions would be 50 per cent overlearning. Such studies show that, within limits, overlearning favorably affects retention and that the longer the interval between initial learning and measurement for retention, the more important overlearning becomes.

Overlearning of the laboratory, however, is not typical of that used in schoolroom situations. In the school, overlearning involves assimilation and interpretation of learning material without much evidence of visible practice. It may consist of further reading on a subject, in applying principles to concrete problems, and of the interchange of ideas in discussion groups. It may also consist in silently thinking about materials that have been read or discussed in class. Overlearning of this type is of the greatest importance to learning, and every subject affords opportunity for its use.

Spacing Practice

The problem of distributing practice involves consideration of three factors: (1) the length of the practice periods, (2) the time interval between practice periods, and (3) the length of time during which practice is continued. It is conceivable that a group of pupils might study a given assignment continuously for 60 minutes, the same assignment for 20 minutes once each day for 3 days, or 10 minutes a day for 6 days. Results of experiments show that large amounts of practice at a single time are less effective than smaller amounts distributed at intervals during extended periods. The optimum distribution of practice varies with the subject matter, maturity of the learner, and other factors; but it is evident that the two extreme conditions of practice should be avoided.

Periods of practice should not follow each other in such close succession as to limit the learner's opportunity to "digest" his material. They should not be spaced so far apart as to permit loss of interest in learning to occur during extended intervals between practice periods.

The problem of distributed practice has direct implications for a number of school practices including (1) the practice of cramming, (2) the length of the class period and frequency of its meetings, and (3) the length of time scheduled for courses.

Effect of Cramming

The principle that practice should be so distributed as to provide the learner with a sufficient amount of time in which certain complex phases of learning, such as reflective or ruminative thinking, may occur suggests that an uneven pace, which results in last-minute cramming, is highly undesirable. Results of scientific studies lend support to the commonly made observation that achievement resulting from cramming has only temporary effect. Because such achievement is at best highly superficial and likely to be limited to the memorization level of learning, there is no sound basis for retention. Cramming is characterized by concentrated effort within limited time; consequently there is little opportunity for assimilation of material.

The practice of cramming is almost always a symptom of two deficiencies in teaching: (1) failure to stress types of response beyond the level of memorization and (2) failure to administer tests frequently enough to ensure consistent performance throughout a course of instruction. When instruction emphasizes higher levels of learning such as understanding and ability to make applications, the learner early discovers that last-minute efforts to learn a subject are useless. Frequent tests designed to measure progress in such types of response will have the effect of demonstrating that higher abilities are a result of gradual development and cannot be acquired by sporadic last-minute efforts.

Frequency of Class Meetings

It is traditional with school systems to reckon learning in terms of credits, which are usually calculated on the basis of the number of hours devoted to class attendance per week. School officials find this practice an easy one to administer in dealing with accrediting associations, determining the number of credits needed for graduation, and the number of hours carried by pupil and teacher. Primarily as a result of this situation, frequent class meetings in the secondary school have been favored.

The significant fact is, however, that frequent meeting of classes often violates the principle of distributed practice, places a premium on rapid coverage, and provides little opportunity to assimilate learning material. The high-school pupil who attends classes every day for periods of from 45 to 55 minutes five times a week may find it difficult to do more than memorize a body of factual material. His learning may be characterized by all the earmarks of cramming. At best, it places maximum stress upon lower levels of learning; at worst, it is a piling-up process, a biting off of unassimilated material.

But to recommend fewer class periods per week obligates one to determine how the time not spent in class may be used. If we recommend that high-school classes meet three times a week, for example, instead of the usual five, it is not intended that pupils should be permitted to use the time released according to their individual preferences. They may use the time afforded by fewer class meetings for assimilating and understanding materials dealt with during class meetings, working on special problems and projects, reading more extensively, and making closer contacts with source materials.

The extra time could profitably be spent by the teacher in selecting and organizing learning materials, elaborating them with reference to greater diversity of teaching aims, and devising testing situations for measuring progress. The extra time may also be spent by teachers in consulting with pupils, going over their

individual difficulties, and guiding them in their written work. Not the least important is the fact that, if teachers could be freed of some of the drudgery of meeting classes throughout a school day, they would have time to know the members of their classes as individuals.

There is an increasing sentiment that the efficiency of instruction on secondary and college levels is not to be measured too closely by the number of hours that the teacher spends in class with the group each week. Instead there is a growing belief that it is better to reckon learning on the basis of demonstrable achievement.

Length of Time Scheduled for Courses

A further postulate is that, within limits, the longer the time allotted for pursuing a given course, the greater the opportunity for thorough assimilation of material. The semester system would be better for this purpose than the quarter system, and a period of greater length than the semester system would doubtless be even more favorable for learning.

We should have fewer courses but extend them over longer periods of time. Intensive concentrated practice may be justifiable only under certain conditions and with certain types of subject matter. In cases in which the aim is to acquire habits and skills that will be used immediately following their acquisition, concentrated practice may be useful. Certain motor skills, for example, in trades and industries or in the operation of machines, may justify intensive practice if they are to be used on the job. Similarly, concentrated study of language skills to be put to immediate use in speaking and writing the language of a foreign country may be justified on the same basis. But justification in all such cases rests upon the assumption that skills and habits acquired during practice will find immediate practical application in situations for which training has prepared the learner.

The principle of distributed practice applies constructively to the planning of sequences of courses in subject-matter fields from

grade to grade. Courses that involve major interest should be so placed that they will not only follow one another in a certain sequential order but extend over a sufficiently long period of time to permit opportunity for the results of learning effort to emerge. If the high-school pupil could take all his mathematics within the period of a single year, it would not be wise for him to do so.

Unifying Practice and Testing

Two principles are important to create a desirable relationship between practice and testing: (1) A test should measure the extent of the learner's achievement in an activity that he has practiced. (2) Test results should reveal evidence upon which to base effort for continued improvement of the learning measured.

Relating Testing to Practice

Many teachers unconsciously cultivate a "cat and mouse" attitude by making of the testing situation a contest to outwit the learner. Every teacher has an obligation to permit the learner to reveal in his examination responses a mastery of the materials and abilities that he has practiced.

Teaching Certain Material and Testing on Other Material. In order to construct tests valid for measuring the effects of instruction, several precautions are essential. Among them is the requirement that tests and examinations should fully represent the learning materials and topics included in a course. Even when a single textbook comprises the entire scope of learning materials, certain topics frequently receive undue emphasis as compared with others. Within this restricted range, classroom instruction may dwell upon certain content material that testing fails to evaluate. Another violation of good testing practice is to require information that has not been adequately dealt with during instruction.

A comprehensive course of instruction may involve not only the use of a basic textbook but also reference material, supplementary reading, personal investigation, laboratory exercises, and

lectures. Pupils are sometimes led to believe that certain aspects of a course are more significant than others only to discover later that the more significant items have been omitted from the test.

Lack of planning also results in important materials being referred to informally and casually during instruction without a degree of emphasis proportional to their importance. The teacher sometimes includes such items in a test regardless of the fact that they were slighted during instruction.

Teaching for One Kind of Response and Testing for Another. The principle of unity as it applies to practice and testing is violated even more frequently when teachers stress one kind of response in their teaching and then test on the basis of some totally different kind of response. Much difficulty results when the teacher does not fully inform the learner at the beginning of the course concerning the kind of response that he will ultimately be expected to make. As a consequence, the pupil may work blindly until the time for examination without the type of response that he is expected to make having been formally recognized.

A student may be led to believe that the examination will stress the derivation of understanding and broad concepts—and the examination may call for a number of detailed facts learned through memorization. On the other hand the pupil may have been led to believe that memorization of specific facts was the principal goal of the course, and the examination may stress important principles.

If emphasis is to be placed both upon specific factual details in course content and upon broad principles, the teacher should be careful to emphasize both as instructional objectives. Continued reference to such objectives should be made during the course with appropriate comment regarding their importance for later tests. Examinations may properly include sections that deal independently with the ability to understand broad principles and with the mastery of factual details. As stated in Chap. VII, the guiding principle is that all course objectives and provision

for their measurement in the testing program should be made to coincide.

Teaching by One Method and Testing by Another. Frequently, confusion occurs between the total aspects of a unit of study and the detailed facts. During instruction, a teacher may stress broad principles in a given field, but the test may require many specific details. Emphasis during an early part of a course in United States history may seek to portray the War of the American Revolution not only as a culmination of resentment against specific arbitrary acts but also as an expression of a growing movement toward principles of freedom and democracy. If such a course has attached little importance to *dates* of major events or the *identity* of significant individuals, the type of learning would not be adequately reflected in such questions as "*When* did Washington cross the Delaware?" or "*Who* was Benedict Arnold?"

A more usual inconsistency of this type may be that of requiring pupils to develop, on a test, their concept of the *total aspects* of a unit of material in which they have been encouraged to master *detailed* information. The fact that an essay examination suggests summarization makes it a tempting device for use when instruction has failed to impart an over-all picture. From the standpoint of classroom management, teachers may feel that activities involving specific detail keep pupils under better control than those dealing with broad themes. For this reason, they tend to place upon tests and examinations the burden of stressing broad significant meanings.

The Misuse of Question Lists. The practice of distributing lists of questions and informing pupils that, if they can give the appropriate answers, they will be prepared for tests and examinations is open to criticism. Most importantly, such lists afford opportunity for preparing pat answers which may be memorized almost verbatim in anticipation of the test, on which the teacher may agree to use only the questions appearing on the list. This practice obviously reduces the type of test to one of factual in-

formation only. The master list of questions may contain items which require ability such as that of applying facts or which necessitate thought and reflection. Permitting pupils to obtain answers requiring such abilities from any source and allowing these answers to be presented verbatim on a test do not require such abilities to function during the testing. The test thus fails to require performance in the ability that the teacher may believe he is cultivating.

This type of instruction fails to stress the necessity of relating isolated material to large divisions of subject matter. The learning during this time may be random and uncontrolled. It is obviously not measured by a test that is focused on a restricted area defined by a list of questions. The practice of cramming is encouraged. Pupils are required simply to perform the motions of learning sufficient facts in order to be able to take a test. Such a test serves only to create a semblance of order and to permit the derivation of a fictitious value from the meager learning that has occurred.

Using Tests to Obtain Evidence of Learning

Much difficulty in creating a properly organized relationship between practice and testing results from failure to extend instructional planning so as to include construction of proper types of test and utilization of the evidence for further learning. Evidence is sometimes examined only in order to determine whether pupils have satisfactorily met stipulated standards of accomplishment. Opportunity for improvement of learning is overlooked under such procedure. If tests have been carefully prepared, they should provide important evidence concerning various elements of learning that the pupil has failed to master. They should indicate areas among learning materials that should be restressed and, if necessary, retaught if preparation for instruction and study in advanced material is to be adequate.

The manner in which errors and omissions revealed by tests are to be indicated involves a vital principle. Teachers some-

times misdirect their zeal for helping pupils by laboriously writing upon test papers the responses that should have been made. The amount of direction supplied by this assistance makes it unnecessary for the pupil to do more than to observe the correct responses that might have appeared upon his test paper. The good intentions of the teacher often result in much unappreciated effort and actually defeat their purpose.

One principle in deriving instructional value from testing is the proper marking of test papers in order to stimulate greater learning effort from the pupil at the points at which weakness has been revealed. Such training is best assured by indicating on test papers where pupils have made errors or have omitted appropriate responses and requiring *them* to assume responsibility for relieving such deficiencies. Test papers appropriately marked may be returned to pupils with the requirement that they add corrected versions of the responses and return them to the teacher for confirmation. Excessive help deprives them of the opportunity not only for learning but for assuming responsibility for their learning effort.

The opposite extreme is to return test papers with little or no indication of the correctness of responses except the grade indicating the teacher's evaluation of performance. In such situations pupils are inadequately guided; they require clues leading to proper areas for further study.

Supplementary instruction should have a definite place in teaching. This type of instruction is centered about the correction of errors and omissions made by the group and refers principally to special assignments, class discussion, further practice, and any activity directed upon points of weakness revealed by analytic use of testing. Supplementary instruction is most valuable when it closely follows testing. Not only is the learning material less likely to have been forgotten, but passing on to new assignments too quickly may sacrifice the degree of mastery that might result from supplementary instruction. For best results test papers should be returned to pupils with minimum

delay. Delay in their return permits pupils to interpret testing as a signal for discontinuing further learning effort. It might be added that there is perhaps nothing more uninteresting than the return of a test taken a long while ago.

Since good learning cannot be hastened by intensive effort beyond a certain point, it is necessary to exercise judgment in determining the extent to which complete assimilation of material requires time rather than continued emphasis. Further improvement in learning often occurs as materials are reorganized during treatment of subsequent materials. It may, therefore, be desirable to measure, upon conclusion of a given unit of material, the learning of preceding units.

The effects of supplementary instruction should not only be integrated with the teaching program but also be evaluated during a continuous process of learning and testing. Effort of pupils to surmount difficulties is stimulated through the knowledge that their improvement will be subjected to retesting.

Prevention of Error

Providing favorable conditions for learning implies skillful guidance at all times. Much of our most effective guidance consists in planning our work carefully in advance. Our job is to plan so thoroughly that it will be unnecessary to talk much about what we intend to do or how we intend to do it. We provide favorable conditions, and the learner profits by our efforts.

After the stage has been set, we may begin to think more directly about supervising the program. Our job then becomes one of directing attention to activities that assure success. There will also be errors in need of correction. Problems arise in connection with the responsibility of guiding the learner through a course of instruction. One is the *time* at which guidance is most effectively given and another is that of the *amount* of guidance. In each case we are concerned with assisting the learner in such a way that he will grow in responsibility and be able to work at his task with minimum guidance.

We can help the learner to get under way in learning a new task by permitting him to *do something* rather than to *analyze something*. We should encourage him to make a complete response even though his efforts will be characterized by omission and error. By permitting him to do something, he is able to familiarize himself with the over-all picture and thereby form a basis for understanding the details of form and structure which normally come later. Response to total situations is the only way in which the individual can learn to react to new situations.

The learner should first respond to total situations and then learn details and techniques as a means of correcting error and perfecting form. Work in English, for example, should provide use for language in oral and written composition and not await complete mastery of rules of grammar and techniques of expression. In music the learner should learn to sing and interpret rhythm before studying the techniques of notes and scales. In English literature, he should be encouraged to read pieces of literature and get some notion of their meaning and significance before analyzing them for style or imperfections.

It is reasonable to believe that all learning situations involve trial and error in some degree. But since trial and error involve a considerable amount of time for futile efforts to occur, the aim of teaching may well be the use of time and effort to better advantage. The amount of trial and error should be reduced to a minimum and replaced by methods in which intelligent and conscious direction prevents waste of time and effort.

Guidance may be given in advance of a pupil's attempt at a learning task, at any time during his initial attempts, or at any other time during learning. For example, we may tell him what to look for in his next geometry assignment and perhaps help him to work one or two problems for illustration. We may also assist him with his geometry after he has made several unsuccessful attempts to solve a problem. We may guide him before he has had opportunity to study his assignment or at any time afterward. In general, guidance is most effective when given

during the initial stages of learning in order that errors committed may be corrected before they become habitual. So long as the learner is conscious of the occurrence of errors and is able to correct them, they are not likely to be detrimental. He may in fact learn as much from his errors as from his successful responses.

The time for giving guidance is importantly associated with the amount. A teacher who goes too far in an effort to prevent errors is likely to defeat his purpose. There is a stage in every learning situation when the amount of guidance rapidly diminishes in effectiveness. Excessive guidance tends to thwart the initiative and the ingenuity of the learner. On the other hand, too little may weaken the learner's confidence. Between the extremes of providing too little and too much guidance there is a middle course. When it is clear that the learner understands the significant principles involved in his task and is prepared to apply his knowledge with a fair degree of assurance that he will be successful, guidance should be withdrawn. So long as the learner is able to detect his errors and is able to correct them, the problem is not one of insufficient guidance but rather an instance of the impossibility of eliminating trial and error entirely.

PROBLEMS FOR DISCUSSION

1. Suggest principles of whole and part presentation that may be applied to secure good learning in a subject-matter field with which you are familiar.
2. Do you agree that pupils generally react emotionally to learning materials as well as intellectually?
3. Present your interpretation of the term *meaningful* as applied to learning materials.
4. Discuss broad and narrow interpretations of drill, evaluating various types of repetitive activity as aids to learning. Of what significance for learning is variety in (*a*) responses sought and (*b*) the media used to present learning materials?

5. Summarize constructively various relationships between practice and testing which should be established in order to secure good learning.
6. To what extent may prevention of error be regarded as an aim in the guidance of learning? Is error (*a*) a fault of the learner for which he should necessarily receive censure or (*b*) evidence that the process of learning is functioning improperly? As a teacher, how would you deal with pupil errors?
7. Give your interpretation of *economy of learning*. To what extent is the effectiveness of practice affected by (*a*) frequency and (*b*) the length of practice periods? Discuss the significance for economy of learning of (*a*) incidental versus guided learning, (*b*) length of material and effort required to learn, and (*c*) recall and recitation.
8. Suggest certain principles for securing the greatest possible value for learning when visual or auditory aids are used.
9. Suggest some of the possible effects upon learning of (*a*) reducing the length of the school year to 6 months or (*b*) extending it to 12 months.
10. Summarize some of the unfavorable conditions for learning that may be attributed to the necessity of teaching pupils in large classes. Suggest procedures for minimizing the effect of certain of these conditions.

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Motivation as Adjustment

Effort to learn is an adjustment activity in the same sense as effort to do anything else. Through learning activity an individual hopes to achieve some gain or to realize a desired ambition. He becomes accustomed early in life to be concerned with himself as an individual and with his relationship to others. Motives are associated with an individual's concern for himself and his status with others. It is customary to generalize his selection of activities as a response to basic urges or fundamental drives. A majority of a child's activities are associated with such considerations as social approval, prestige, and status among members of his age group as well as of adults. Desire to be active and to satisfy curiosity may also be considered basic urges. Other types of basic urge include concern for personal safety or need for food and shelter. At adolescence, motives are influenced by sex-social development.

Fundamental motives stimulate activity which may result in the satisfaction of such urges or in avoidance of their frustration. These motives likewise determine how an individual will direct his activities or how he will choose among possible courses of action. An individual may often not fully understand his own motives. In motivation we are not necessarily concerned with reasons but seek to influence action through appeal to motives that are felt.

Goals in some cases are attained in the performance of a given activity. Others are achieved as an indirect result of activity. The results of one's performance may have intrinsic worth and constitute ends in themselves. A pupil, for example, by his success in arithmetic may derive personal satisfaction in the skills that he has mastered. On the other hand, he may derive little or no satisfaction from completing an assignment in arithmetic except to avoid the necessity of remaining after school and sacrificing an afternoon of baseball. He may also work on his arithmetic to obtain a *mark*, which may symbolize approval with even

greater force than the personal satisfaction derived from correct solution of arithmetical problems.

Incentives may be thought of as spurs to achievement and be regarded as devices for appealing to an individual's motives. Incentives stimulate the pupil to increase his activity as a means of satisfying his motives. They constitute tangible references to basic motives. A pupil may be made conscious of an incentive in cases in which appeal to a basic motive might be fruitless. Thus we offer the incentive of a satisfactory mark in a course even though the basic motive involved is that of maintaining status in the group.

Incentives that arouse a pupil's motives usually do so most effectively when their influence is closely felt during the performance of a given activity. Pupils are not strongly stimulated by remote goals. The prospect of becoming a mechanical engineer is likely to have far less effect upon inducing a pupil to apply himself diligently to arithmetic than immediate recognition, such as commendation by the teacher or success in equaling or surpassing the performance of his classmates.

The results of learning and attainment of instructional objectives do not always constitute adequate goals for the learner. We do not expect all pupils to discover in their work complete satisfaction of their basic motives. Gains to be derived as a result of diligent study are often too remote to influence pupils strongly to exert necessary effort. Pupils may even derive satisfaction of certain motives from being indifferent toward their work. It is obviously desirable for learning materials to be intrinsically stimulating. They can often be made more attractive, however, through the judicious use of incentives.

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requires, use of incentives during instruction produces increased interest and application.

Keeping the Learner Informed of His Results

Some pupils prefer courses, such as arithmetic and algebra, because their activities in preparing assignments are self-evaluating. In many cases, a pupil can determine by certain checking devices whether his solutions of problems or exercises are correct. In social sciences he cannot be so sure that his effort is resulting in desired types of mastery, although he is frequently making more progress than he supposes.

If tests are properly related to learning, they inevitably reveal progress to the learner whether so planned or not. Through careful planning, the effectiveness of tests as instruments of motivation may be extended. Studies have repeatedly demonstrated that knowledge of his progress can serve as a continuous incentive to the learner. The learner needs to know not only what he is seeking to accomplish but how successfully he is accomplishing it.

Because of the intimate relationship between learning and testing in the elementary grades, the results of instruction are continually evident to pupils during their performance. Desk work and daily activity reveal the character of performance without the use of formal measuring instruments. Pupils of early grades learn of their success and failure largely through the teacher's reactions, which indicate whether their effort is commendable or unacceptable. During these grades, pupils are affected to a greater extent by a teacher's words than by a written mark. The teacher's personality is more closely associated with success in these grades than at any other time.

In secondary schools and colleges knowledge of results is more commonly revealed through formal tests and examinations. Through appraisal of daily practice the teacher often seeks primarily to determine whether required work has been done. Only through test results are many students able to discover whether they are gaining in proficiency. As we shall see later, the crucial

point in determining the effect of knowledge of progress is to be found to a large extent in the manner in which test results may be related to the individual's expectation of achievement. We are at present concerned with conditions that make a learner aware of his attainment.

Among these conditions the most significant are the frequency with which tests are given and constructive purposes for which the results are used. Tests should be given frequently enough to reveal progress to the learner in terms not only of content mastery but of thought processes and types of ability which use of such content has stimulated. There should be an adequate number of short tests followed by longer and more comprehensive ones in order to emphasize the continuous nature of progress. Frequent short tests, used primarily to guide pupils in types of response expected, serve as teaching devices in that they inform the learner of his successes and deficiencies without penalizing him severely for errors. Longer and more comprehensive tests should be used to measure the results of instruction and to serve as a basis of evaluation.

Experimental evidence demonstrates that marked improvement results when test papers are returned promptly and constructive use made of results. Often a pupil may be motivated by the opportunity thus afforded for making further improvement. A teacher uses tests constructively when he is continually guided by their results in his effort to help pupils.

The following principles should be observed in informing pupils of progress:

1. *Test results are more effective when they reveal the learner's performance analytically as well as compositely.* Compressing the results of a test into a single score or mark has some value. But it is more stimulating if the learner knows the parts of the subject matter in which he is proficient and those in which he has further opportunity to improve The results are even more meaningful if his performance is analyzed by test items in detail. The learner also benefits if his tests are analyzed with refer-

ence to the types of ability demonstrated. Knowledge of his achievement will be more significant, for example, if he knows that although his mastery of specific facts is inadequate, his treatment of major concepts involving reasoning is of good quality.

2. *The pupil should have had opportunity to review previous tests before taking additional ones.* Failure to score tests and return them promptly conveys the impression that they are not given in the interests of the learner. It also makes it possible for errors to persist throughout several testing periods and affords the pupil an inadequate basis for correcting specific points of error or omission.

3. *Test results are more effective when they reveal performance in terms of individual as well as group progress.* In many cases a pupil makes improvement that is conspicuous in terms of his individual ability and preparation. Superiority in a special ability may deserve mention in order to inform him that he has some basis for prestige. His improvement may suggest that he has made actual gain in certain abilities in which he was deficient, even though his total score still places him in approximately the same class rank. He may do exceptionally well in some aspect of a test but as a slow learner be unable to achieve the same amount of performance during a test as other pupils. But if he makes any noteworthy gain over his previous record, it should be recognized. Recognition of one success in learning may overcome the effect of several instances of failure.

4. *Frequent testing is more beneficial to a slow than to a rapid learner.* Since slow learners have less insight into their abilities than able learners, they depend to a greater extent than their abler classmates upon test results for knowledge of their performance and need frequent checks of their progress.

Exemption from the Final Comprehensive Examination

Teachers sometimes offer exemption from the final examination as a reward for superior achievement during a course of instruction. This inducement is offered to pupils who maintain their

test grades at a specified level or who achieve a stipulated average mark. The practice has among its various aims the encouragement of consistent performance and the prevention of last-minute cramming.

In some types of subject matter the influence of a final examination upon effort to organize and unify materials is secondary to its effect upon consistent achievement during a course of instruction. In subjects involving motor skills, such as shopwork or mechanical drawing, because of the accumulated evidence of completed projects, formal testing may be unnecessary. In such subjects as dramatics, public speaking, and journalism the teacher may prefer to evaluate achievement on the basis of the kind and amount of individual participation. Some teachers believe that pupils who consistently make high scores on tests will make similar scores on the final examination and that further testing is unnecessary.

There is danger that a teacher may cultivate inconsistent attitudes toward testing by offering exemption. Implicit in exemption is the belief that pupils may fear the final examination and be anxious to escape it. On the other hand, it is desirable to encourage pupils who must take the examination to face it confidently without anxiety.

The final comprehensive examination serves as an incentive for continued learning throughout a course. It stimulates the learner to organize content material into a unified pattern. Completion of each unit of material suggests finality; consequently, pupils often fail to feel the need of retaining what they have acquired. The necessity for retaining knowledge, step by step as it is acquired, requires emphasis upon an ultimate goal.

Experimental evidence indicates that learning is less permanent when students are exempted from the final examination. White [1] classified students of general psychology into experi-

[1] WHITE, H. B., Testing as an aid to learning, *Educ. Admin. and Supervision*, 1932, 18: 184-194.

mental and control groups. The experimental group was told that its final examination would comprise material covered on weekly quizzes and that the final grade would reflect the average of quiz marks and the result of the final examination. The control group was told that its grades would be the average of quiz marks. All weekly quizzes were scored and returned. Immediately preceding the final examination, the control group was told to take the final examination and to attempt to do its best, although according to agreement the results would not count toward the final grade.

The average scores that both groups obtained on weekly tests were not significantly different even though the results of tests were the sole basis for the final grades of the control group. The experimental group, whose achievement on the final examination was to count toward its term grades, showed superior achievement in the final examination. There was evidence that this group made constructive use of the results of weekly quizzes and also made special effort to prepare for the final examination.

Exemption from the final examination tends to ignore pupil differences. Slow-learning pupils are unable to meet requirements for exemption, which set the reward for high achievement beyond their reach. Rapid learners readily qualify for exemption. In other words, exemption favors those who are most able to take the examination. Since opportunity for exemption is not uniform for all pupils, the possibility of exemption suggests punitive treatment to pupils whose low mental capacity precludes exemption.

The most significant basis upon which to evaluate the final examination is its contribution to good learning. The motivating value of the final examination is found in the opportunity that it offers for revealing superior achievement.

It seems that considerations other than those of good learning prompt some schools to grant exemption from the final examination or to discard it entirely. Such a policy invites superficial, fragmentary learning. A better solution lies in the direction of

correlating the final examination with the materials and abilities emphasized in each course and using it to assist the pupil who has made diligent effort to reveal his achievement. A final examination that makes fair demands of the learner is a legitimate incentive to good learning.

Stimulating Attainment through Verbal Expression and Reward

An important class of incentives operating through their effect upon knowledge of progress includes verbal expressions of approval or disapproval and tangible rewards. It is customary to regard many incentives belonging to this group as paired opposites, such as praise and reproof or reward and punishment. Prizes in the form of books, medals, places on the honor roll, or gold stars represent rewards. Loss of privileges is a common form of punishment. The characteristic effects of these incentives on learning have so much in common that we may use praise and reproof as illustrative.

Since praise and reproof are usually orally expressed in the presence of all pupils, social reaction frequently heightens the effect of a teacher's comments. To the pupil the results suggest gain or loss in prestige as well as success or failure in the learning situation.

In experimental study involving incentives, the tendency has been to regard praise and reproof as psychologically opposed reactions. Praise and reproof have not been treated as they are typically used in classroom learning situations. There are many gradations of intensity in the use of praise and reproof. In schoolroom situations they are often intermingled. A teacher may react unfavorably to lack of neatness in a pupil's work but favorably to the correctness of his responses. A pupil may be praised for completing a large number of exercises but reproved for frequent errors.

Few teachers carefully weigh the relative value of praise and reproof. Their comments are generally spontaneous and are based upon gross impressions. They may be influenced by a

pupil's conduct and his conformity to classroom purposes. Praise that a teacher bestows upon a pupil for noteworthy performance may identify him as a recipient of undue attention and alienate him from his group. We may expect greater impersonality in the case of tangible rewards. Prizes and honors may be planned in advance with greater care and be awarded more objectively.

A consistent research finding is that praise and reproof may have similar effects. Ordinarily, we may expect praise to result in a pupil's desire to continue the effort that brought him praise. Reproof may be expected to result in change in the pupil's mode of response. Under some conditions, however, reproof may have the same effect as praise. Both may spur pupils to diligent effort. The effects of praise and reproof depend upon the total situation, which includes characteristics of the individual learner, the personality of the teacher, the presence of an audience and its reactions, and the nature and difficulty of the learning task. Such variable factors tend to make the effectiveness of praise and reproof specific to each situation.

There is usually a difference, however, in result when some form of reward or punishment follows pupil effort and when effort is ignored. Either praise or reproof may disturb a pupil's equilibrium and cause him to exert effort to regain his balance. A neutral attitude toward a pupil's work, on the other hand, may result in neutral performance. The comparative effectiveness of praise and reproof in contrast with ignoring a pupil's efforts is shown in Fig. 29.

It is unwise to reprimand a pupil for slowness when he is working up to capacity. His effort may involve an inadequate but earnest attempt to obtain success. To belittle his attempt is to frustrate his striving for even low accomplishment. A bright pupil is often able to recover readily from reproof. Since he is capable of improving his status, it is easier to show him the value of high standards of achievement.

In praising or reproving it is important to observe the effect upon the learner. The effectiveness of such incentives varies

with age, sex, and intelligence. As a rule, the effects of encouragement are beneficial. Excessive praise, however, may create an attitude of self-complacency among pupils who are capable of superior achievement. Censure is best reserved for those who are capable of responding adequately to the challenge implied.

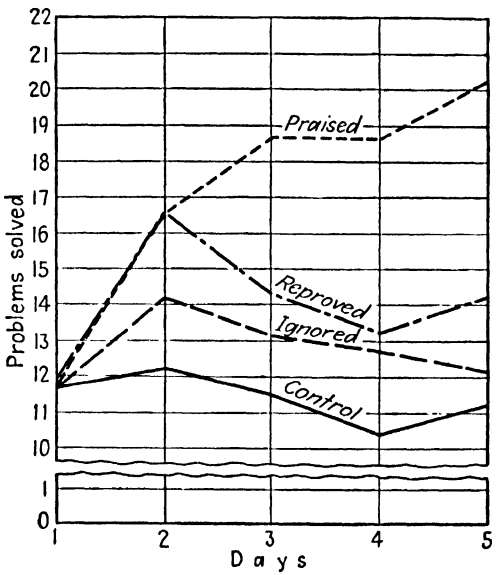


FIG. 29.—Curves of work under various incentive conditions, as measured by average scores on arithmetic tests over a period of 5 days. (*From Hurlock, after S. L. Pressey, Psychology and the New Education, Harper & Brothers, New York,* 1944.)

Praise is even more important in dealing with young children than older ones. Boys take reproof less to heart than girls. Children who are timid, immature, emotionally unstable, or sensitive tend to respond inadequately to blame. Evaluation of praise and censure cannot be made on an "either-or" basis so far as the inherent merit of either extreme of incentive is concerned, but requires understanding of each individual.

A positive incentive, such as praise or encouragement, is usually more dependable in its effect than a negative one. A positive incentive is more readily interpreted as an indication of the

teacher's attitude of helpfulness and interest in the learner. A rebuke is more likely to secure a desired result when it is tempered with a word of commendation regarding some aspect of improvement. A rebuke may fail to serve constructive purposes unless it suggests opportunity for improvement.

A respected teacher may reprimand pupils for poor work without sowing seeds of personal resentment. The practice of praising everyone may cause pupils to be indifferent to the teacher's comments as critic. It is seldom that there are no occasions for reproof. Pupils are often aware of their own lack of effort and are critical of a teacher who does not discover it and hold them to account.

Individuals in many instances do not work for praise as a specific goal; however, they may strive to avoid blame. Yet, under some conditions pupils decide whether they desire reward or punishment. A place on the honor roll is not desired as a reward by all pupils. On the other hand, being sent out of the classroom is an allurement to some pupils because of the prestige they associate with being identified for attention.

Rewards should ordinarily be accompanied by friendly rivalry and good sportsmanship. It is obvious that rewards should not attract pupils to work for the reward alone. Some rewards, such as prizes or medals, may cause pupils to perform learning tasks superficially in the hope of making the results of their effort impressive. Rewards are most effective when they encourage pupils to undertake increasingly difficult tasks or those requiring additional responsibility.

Cooperation and Competition

In cooperation and competition are found impelling incentives similar to those which operate within the social and economic organization of society. An individual must compete with other individuals in order to achieve desired status in the group. Both cooperation and competition offer effective channels for bringing satisfaction to an individual. Competition and cooperation fre-

quently operate simultaneously. In a sense, cooperation and competition cooperate and compete with each other.

The relationship between cooperation and competition is complex. The individual's personal gain is the ultimate consideration whether he cooperates or competes. A football player cannot engage in a football game alone. He must cooperate in the interdependent activities of the members of a team. He cooperates in order to share in the experience of winning victory for his school. The team must compete with other teams in order that its cooperative activity may have meaning. The player must compete with his teammates if he is to be selected for the position he desires. In either instance, it is the player who stands to gain or lose. Collective enjoyment is possible only through the enjoyment experienced individually by each person concerned.

Teaching procedures are usually planned with reference to pupils assembled in groups in which all pupils are engaged in related activities. In the sense that pupils are occupied with related learning materials and work together toward common goals, their activity may be regarded as cooperative. In the sense that social influences impel pupils to seek individual or group superiority, learning activity is competitive. Both cooperation and competition in the classroom are true life situations.

Influence of the Group. The classroom provides opportunity for many group influences to operate. When pupils work together, certain characteristic motivating factors operate even though the teacher makes no special effort to create them. There are two aspects to consider: (*a*) how a pupil is influenced by working on an individual problem in the presence of a coworking group and (*b*) how a pupil is influenced by working on a common problem in a group.

Working in isolation versus working in groups. When the effort of individuals working in isolation is compared with that of those who work in the presence of a coworking group, interesting results are obtained. The speed and accuracy of many types

of work are increased by the presence of the coworking group. The increase is most marked in routinized tasks. In tasks requiring initiative, reasoning, and reflective thought, working in isolation is often more productive. Reflective thinking is more easily distracted than that which requires only mechanized responses.

The influence of a coworking group often proves more helpful to slow-learning pupils than to more able ones. The pupil who learns rapidly is aware of his potentiality as a pacemaker. He is not motivated by the necessity of keeping up with someone else. The presence of a group also appears unfavorable to the learning of individuals who are emotionally unstable, regardless of mental capacity.

Collective thinking. When teachers use socialized methods of dealing with problems or projects in the case of small groups, the effectiveness of collective thinking is important. Some studies show that superior performance more frequently results when pupil groups select their own members on the basis of congeniality or common interests. Self-selected groups often cluster spontaneously about an individual who has capacity for leadership and are prepared to work effectively from the start. Such groups perform better than those which are appointed on an arbitrary basis. Groups that are homogeneous with respect to social status usually profit more by collective thinking than those which are of varied composition.

Collective thinking is valuable when the group is working on subjects which require formulation of hypotheses or which involve principles and issues such as debating activity. Variability in the opinions and ideas of members of a group is usually reduced by collective thinking. In a group situation, individuals tend to compose their differences and to act with greater unanimity of purpose.

Group thinking usually affects slow-learning pupils most favorably and rapid ones least. This situation offers a challenge to the teacher to provide for the bright pupils activities at which

they can work at maximum capacity. The bright pupil generally assumes leadership in the group and carries the burden of the work. Inferior pupils profit by such contacts when their status in the group is adequately safeguarded. Inferior pupils gain more by working with a group as a result of the greater number of ideas that the group situation fosters.

Little evidence is available concerning the optimum size of collective thinking groups. Beyond certain limits, a group becomes unwieldy. Much effort is lost in an oversized organization in which a few members may carry the burden of the work.

Individual versus Group Rivalry. In classroom situations attitudes of rivalry are almost always present. Pupils are continually measuring themselves in comparison with other pupils. Those who take pride in high scholastic achievement seek to equal or excel the records of other able and ambitious pupils. In so doing they compare themselves with standards set by others whose approval they most desire. Some also make intensive effort to surpass their own records.

Competition between different individuals and effort of an individual to improve his previous record are more spontaneous and require less encouragement than rivalry of one group with another group. Modern schools foster rivalry of group against group and of pupil against the group through the staging of contests and awarding of honors. Capitalizing the tendency of pupils to compete results in making many tasks more interesting. Rivalry between groups and rivalry with one's own record are desirable. Rivalry between individuals, because of the possibility of mutual distrust, is regarded as less wholesome.

In a number of experimental studies effort has been made to measure the effect of group rivalry upon achievement. In some instances two equivalent groups are used, one of which receives special stimulation, whereas the other works under usual conditions. Inspirational talks and other means of motivation are used to initiate rivalry. The experimenter sometimes directs the members of one group to do as much work as possible but not to

try to think about rivalry with the other group. Another group is told to do as much work as possible and to attempt to excel their rivals in the other group.

In most cases the group in which intense rivalry is encouraged performs more work. Rivalry creates opportunity for personal reward and results in improvement of school achievement much as in the case of physical sports. It also stimulates a greater degree of cooperation among members of a group and leads them to work together more harmoniously.

Within group-against-group rivalries, we frequently find individual rivalries when the activity discloses the achievement of individual pupils, permitting comparisons to be made. For example, we may expect individual rivalry to be present to a greater extent in a contest such as a spelling match than in competition between two classes. In a spelling match, it is a question not only of the group that will be eliminated last but of the individual rivals who survive longest while the contest is in progress.

The force of personal appeal is also felt more strongly when the school offers a prize for an individual member than when a prize is offered to a group. In the one case the pupil, as a member of a group, works for a prize that he or some other individual may win. In the other case, as a member of a group, the pupil works for a prize that his group may win. Under experimental conditions, working for an individual prize produces definitely superior results. The results of Maller's experiment, as shown in Fig. 30, forcefully demonstrates that pupils in the elementary school respond more efficiently to an incentive of a personal nature than to one of a group nature.

Explanation of superiority of individual motivation is to be found in the personal appeal made. Where individual rivalry is present, the individual feels that his status and pride are constantly under scrutiny. The desire to surpass the other fellow is a strong stimulation because one's own self-esteem is at stake. Consequently, such competition is a personal experience. Com-

petition as a member of a group contending against another group is less personal. Individual gains are absorbed in average group scores.

Cooperative stimulation is more effective when members of a group feel that they will be personally benefited. Under highly

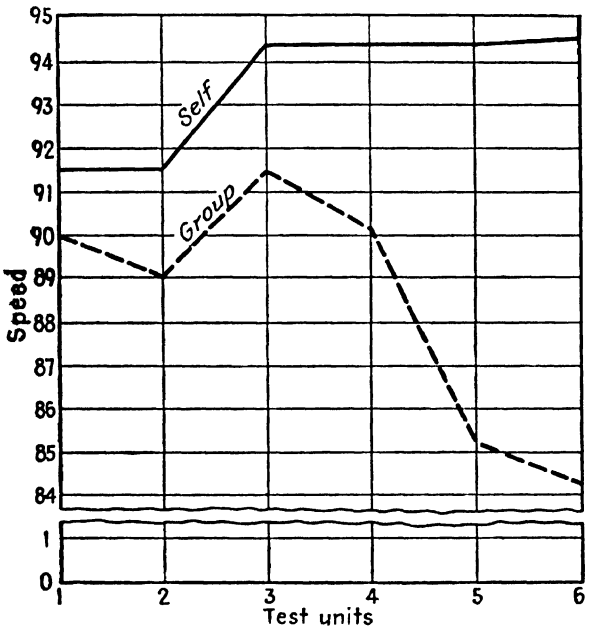


FIG. 30.—Progress of the six test units of work for self and group. (*After Maller.*)

organized conditions, in which each individual member feels responsible for carrying his own load and making a direct contribution to attainment of group ends, it is conceivable that cooperation may be fully as effective as competition. A cooperative undertaking needs to have a basis for making the influence of mutual gain felt by each member concerned. Thus cooperation in the broad sense implies democratic participation by all persons concerned and harmonization of group gain with personal interests.

Socialized methods involve cooperation and competition and necessitate the development of conditions under which each pupil

experiences maximum personal gain with minimum personal loss. Competition should be encouraged within a framework of cooperation. In cooperation, competitive activities may be controlled in such a way that group success may lessen feeling of individual failure. When a pupil fails to win as a direct result of competition, his failure is offset by his gain as an indirect result of cooperation. The football player who competes unsuccessfully for the particular position he wanted may still receive a reward when the team through cooperative activity gains victory.

Instead of regarding cooperation as a form of self-sacrifice, it is legitimate to examine realistically the personal gain possible. Pupils may be encouraged to cooperate in order that all may gain. The strongest appeal for a cooperative attitude is the gain to each member of the group. Cooperation in school activity is assured when each pupil feels that he "belongs" and when all pupils are encouraged to participate freely in school life. Mutual respect is fostered when the administration of the school actively sponsors democratic procedures in student government and extracurricular activities for all pupils.

Learner's Level of Aspiration

During a pupil's learning activity, his effort is constantly affected by the nature and intensity of his motives. He gauges the difficulty of every learning task in the light of his own felt ability to achieve. He places a valuation on such tasks in terms of his expectations of success or failure. Success and failure are relative to the individual's heights of ambition and the extent to which he attains them. He will work with greater effort toward goals that he feels he can reach than toward those which he feels unlikely to attain.

We may call a pupil's changing goals his *levels of aspiration* and conceive of their being raised or lowered according to the degree of success or failure that previous attempts at similar types of performance have led him to expect. Social pressure is a significant force in determining levels of aspiration. The pupil is

sensitive to the fact that his self-esteem and social prestige are at stake if he differs markedly from other members of his group. Social pressure can stimulate the individual to set his goals higher than he is able to attain.

Pupils do not wear badges revealing their highly personalized levels of aspiration. The motives that prompt them to activity are often inscrutable. We have experimental evidence, however, that a pupil's performance is definitely more than a matter of chance expectation.

Sears [2] experimented with a large group of elementary-school children to study the effect of knowledge of results in reading and arithmetic upon variation of levels of aspiration with successive performances at a series of comparable tasks. Upon the basis of their previous records of achievement, three groups were formed. The *success* group had high records in reading and arithmetic. The *failure* group had low records in reading and arithmetic but was otherwise matched to the success group with respect to age, intelligence, and socioeconomic status. A *differential* group, similarly matched in background factors, had good records in reading but poor records in arithmetic.

Each pupil was given singly a series of tasks to perform in reading and arithmetic; and the performance at each task was immediately scored before the task following was undertaken. After each pupil learned his score upon a given task, he was asked to predict his score on the next task. The results of the investigation were analyzed on the basis of the discrepancies between the scores predicted and those actually obtained.

Sears found that pupils in the success group showed a strong tendency to adjust their levels of aspiration within relatively narrow limits. Those who had a history of failure, on the contrary, showed extreme fluctuation. In many cases, they set their goals unnecessarily low in order to establish a wide margin of

[2] SEARS, P. S., Levels of aspiration in academically successful and unsuccessful children, *J. Abnorm. and Soc. Psychol.*, 1940, 35: 498-536.

safety against failure or persisted in striving toward excessively high goals which they could not reach. Some pupils appeared to assume that there was little use in trying, others that they were equal to any task. In the differential group, pupils fixed realistically their goals in reading but fixed in an irregular, unrealistic manner their goals in arithmetic, in which they had poor previous records. The types of reaction depended to a large extent upon the conditioning effects of success or failure during previous school experiences. Success had given to one group confidence and capacity to appraise a learning task. Failure had given to the other group a feeling of frustration, causing its members to rationalize or overpersist in setting their goals.

In fixing his level of aspiration, the individual has to resolve a conflict between two opposing influences. One is the tendency to limit his level of aspiration to his capacity to achieve in order to avoid loss of self-esteem. An individual pupil is willing to strive for achievement only if he has set a sufficiently high goal so that its attainment will mean success. The effect of overreaching expectation is to stimulate the individual to set goals that may result in attainment more significant in terms of success. But if he does not attain his expectation, he will tend to lower his goals in order to lessen the probability of failure and to convert an unpromising situation into one of relative success. In other words, he cannot enjoy fully a task that promises either easy victory or inevitable failure.

The other tendency is to attempt to perform at a level higher than his ability warrants. The group encourages an individual of low ability to raise his levels of aspiration, but usually withholds its support from those who seek extremely high levels. The pressure of the group encourages conformity. Conflict between fear of psychological failure and failure to win approval in maintaining goals that are socially acceptable may result in a level of aspiration near the top range of one's ability.

The nature of the task is importantly associated with the level of aspiration. If a task is too difficult, the individual will not at-

tempt it because he sees no chance of success. If the task is too easy, he may not be challenged to do his best. Psychologically, he does not experience a real feeling either of success or of failure unless the difficulty of the task is close to his level of ability.

In the middle ranges of ability, pupils characteristically set their levels of aspiration at points at which they may avoid failure and attain success. They are not strongly self-motivated to perform difficult tasks at which they are likely to fail or to perform easy tasks that afford no satisfaction in accomplishment. Pupils of low ability, however, may be frustrated if social pressure continues to compel them to seek goals which they lack ability to achieve. Pupils of extremely high ability are not frequently encouraged in the pursuit of high levels of aspiration.

Among the implications for motivation is the importance of assisting the learner to strive toward levels of aspiration appropriate to his ability. In a former era, it was not uncommon to hear educators hold out possibilities that anyone might become a Lincoln or a Washington. But with rapid expansion of educational opportunity and increase in number of pupils enrolled in schools, the attitudes of both psychologist and educator have become more realistic. Pupils are now urged to set goals in keeping with their abilities.

If we are to advise pupils wisely, we must assist them in appraising their abilities. Our basis of evaluation should include all important aspects of development. There is still a tendency to predict a pupil's future success on the basis of his performance in a particular course. The teacher's appraisals must take into account not only wide differences between individuals but differences within the same individual. Narrow standards deny pupils an opportunity to experience success in varied aspects of achievement. Broad standards will permit them to explore many fields of achievement in their search for success.

Good motivation demands sufficient flexibility in the difficulty of schoolwork to provide tasks appropriate for those of low ability as well as other tasks sufficiently challenging for those of

high ability. Much learning material is lacking in range of difficulty, with a result that pupils at the extremes of ability are inadequately motivated. For many pupils, schoolwork is either too easy or too difficult.

The problem is to guard against rewarding the superior pupil too well and the inferior one too poorly, particularly when similar responses are expected from both types of pupil. The superior learner may accept high marks as superficial evidence of success without experiencing the genuine satisfaction of having met a real challenge to his ability. The inferior learner may deserve commendation for struggling valiantly to solve problems that he cannot understand. Tasks set for him must be kept within the range of his ability.

Although we should not encourage pupils to aspire to levels of achievement that they are manifestly incapable of reaching, we should guard against discouraging hope of improvement. Since it is not easy to establish a definite criterion for determining how high a level each pupil should seek, we should endeavor to know each individual sufficiently well to judge him by broad standards. Many persons prove successful in work in the very fields in which their teachers pronounced them failures. We should think of the pupil's possibilities for growth and broaden our concept of success to include varied types of improvement.

The Teacher as Critic

The problem of enlisting the pupil's effort to learn is not solved by accumulating a bag of tricks and selecting those which may be applied to specific situations. Motivation is primarily the art of dealing effectively with individuals in such a way that each is stimulated to attack his problems confidently. Pupil effort is more persistent and uniform when the teacher's guidance inspires confidence.

The teacher may do much to make the classroom setting effective by showing a genuine interest in the learner. Attitudes of helpfulness result from a desire to understand the nature of a

pupil's problems, the conditions of his home and community life, and his goals or ambitions. It is sometimes difficult to realize that pupils have individual purposes and are sensitive to the attitude of the teacher toward their aims. Being interested in immature individuals means cultivating ability to understand life from their point of view and to guide them toward more mature standards of value.

With their limited experience, difficulties and rebuffs as well as expressions of sympathy and kindness are greatly magnified in significance. Adults in most cases have developed certain protective attitudes and a more adequate capacity for emotional adjustment. Adults likewise have less restricted opportunity for movement in choosing satisfying surroundings. The teacher who is interested in his pupils serves in the role of a friend and seeks opportunity to encourage and cooperate.

In order to stimulate personal effort, attitudes of self-responsibility should be cultivated. It is the teacher's duty to designate learning tasks that are significant, supply direction, and assist the learner in appraising his progress. The fundamental attitude of each pupil should be that the performance of his task requires initiative and resourcefulness. It is easy for a teacher to be zealous and to plan a pupil's activity so minutely as to leave him little to do other than follow explicit directions. In such cases pupils are deprived at the start of the opportunity to plan for their own successes. They perform those activities which are indicated but are often so carefully guarded that they come to regard errors as the fault of the teacher.

Children are motivated to a greater extent if they are trained to depend upon themselves in selecting responses and in assuming responsibility for the results. Self-responsibility may be cultivated if the teacher is sensitive to the pupil's effort and assists him in finding satisfaction by doing things for himself. We may influence him to take pride in his accomplishment by encouraging him to complete at least a part of every task unaided.

Restoring a learner's confidence is often an important step in

encouraging him to make effort. Continued failure may have thwarted his hope of attaining success. The teacher's problem in such a situation is to recognize whatever ability may be evident and to provide meaningful tasks that the pupil can perform. Recognition of a pupil's abilities and interests is important in dealing with a learner who lacks confidence, since our goal is to develop his belief in his ability to achieve. Confidence in his own worth is the foundation upon which to develop assurance that he may successfully undertake increasingly difficult tasks.

Teaching carries with it the responsibility of playing the role of critic, indicating errors and suggesting ways in which improvement can be made. The function of a critic should be primarily that of appraising performance. The teacher will often find it necessary to indicate errors as well as to refer to points of merit. The positive approach of showing a learner a way out of his difficulties spares him the discouragement of condemnation. During initial stages of a learning task, we must remember that imperfect performance is usual. We should not confuse the learner or destroy his confidence by magnifying small errors before he has completed his undertaking. Then, when we acknowledge that his theme or report represents commendable effort, we have a basis for tempering our correction of his errors.

As critics, we should cultivate in a pupil the attitude that we are critical of his performance and not of him as a person. The fault, if any, lies in the fact that errors have been made, not that the pupil is guilty of personal offense in making them. The more we may convince a pupil that our aim is to improve his performance, the easier it is to criticize his work on the basis of its merits without leaving the impression that we approve or disapprove of him personally. Most pupils can accept criticism in good spirit if we do not make error a basis for personal condemnation.

Finally, pupils are better motivated when the teacher directs classroom activities enthusiastically and purposefully. If the teacher has faith in himself, regards instruction as a cooperative

enterprise, and is appreciative of accomplishment, pupils share his attitude and assimilate much of his confidence in the possibilities of success. Such a teacher will be tolerant of errors, seek to correct them impersonally, and lead pupils to expect success. Setting the stage for success is the keynote of motivation.

PROBLEMS FOR DISCUSSION

1. Evaluate the assertion that motivation of some sort is associated with every human activity.
2. Discuss some of the difficulties involved in determining the conditions under which a child will make effort to learn.
3. From your knowledge of a child's development, suggest certain motivating devices that become (*a*) inappropriate after certain age levels and (*b*) significant only after certain age levels are reached.
4. There is a popular notion that to a child a reward may serve as a bribe and make him increasingly reluctant to act without it. Discuss the extent to which this criticism has a bearing on school practices involving rewards.
5. Discuss possible injurious effects of the wrong kind or amount of motivation. Compare the effects of overmotivation with those of undermotivation. Suggest several criteria that may be used in judging the value of a particular incentive.
6. Personal relationships with a certain pupil are cordial, but he resents being forced by the administration to enroll in your course, which does not interest him. He consistently refuses to participate and sits silently in class. He has mental capacity for satisfying low-grade requirements. Without administrative cooperation, you must face the perplexing motivation problem yourself. What are some of the first steps you would take?
7. You may have expected from discussion of motivation to learn of certain tricks or procedures helpful in making pupils want to learn. Why do you suppose the author, instead, has

sought to familiarize you with some of the fundamental conditions of motivation?

8. To what extent may a learner's level of aspiration be regarded as a crucial point in the problem of motivation, regardless of the type of incentive? What is its significance in determining the amount and kind of motivation?
9. Is the motivation of effort to learn essentially new among modern ideas about teaching? To what extent does current interpretation of desirable motivation suggest a shift of emphasis from "making the pupil learn" to "making him want to learn"?
10. Evaluate the statement: "Cooperation does not have to beg for recognition in a cringing, humble manner. On the contrary, it may rightfully promise to contribute as liberally to an individual's personal gain as competitive activity."
11. Certain individuals may be continually motivated by a sense of duty or responsibility whether they are interested in a subject or not. As commendable as such a spirit is, some critics suggest that it is essentially self-motivation and, therefore, not so desirable as interest in the subject matter or ability to discover satisfaction of personal needs. Comment on the merits of this contention.
12. Although textbooks in psychology frequently suggest to teachers that interest and accomplishment are nourished by success, many students believe that the idea of success has been overemphasized, asserting that "most persons cannot attain, in our present social order, what has been considered success." You should be able to point the fallacy in the reasoning as stated.

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