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THE FORTY-FOURTH YEARBOOK

Educational Diagnosis

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THE THIRTY-FOURTH YEARBOOK

OF THE
NATIONAL SOCIETY FOR THE STUDY
OF EDUCATION

EDUCATIONAL DIAGNOSIS

*Prepared by the Society's Committee on
Educational Diagnosis*

Leo J. Brueckner (Chairman), Guy T. Buswell, Willard C. Olson, Paul T. Rankin
John L. Stenquist, Lee Edward Travis, and Ralph W. Tyler
Assisted by Members of the Society and Others

Edited by

GUY MONTROSE WHIPPLE

THIS YEARBOOK WILL BE DISCUSSED AT THE ATLANTIC CITY MEETING OF THE
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EDITOR'S PREFACE

The suggestion that the Society arrange for the publication of a volume upon the techniques of educational diagnosis was first made by Professor Brueckner early in 1931. At the April meeting of the Board in that year this suggestion was discussed. Professor Brueckner's idea had been to summarize and evaluate the work being done in diagnosis, but it was thought by some of the Directors, particularly Dr. Bagley, that the theme might be enlarged to an appraisal of the whole testing movement. Director Freeman was requested to report at the next Board meeting upon the feasibility of this enlargement of the theme. His report, presented at the November meeting of the same year, convinced the Board that it was inadvisable to undertake a yearbook upon the evaluation of the testing movement generally in education, but that it was advisable to secure from Professor Brueckner a further statement, for consideration at the Board meeting in February, 1932, of the methods and contents of the treatment he had in mind originally, along with suggestions as to the personnel of a satisfactory working committee. As a result of Professor Brueckner's statement, funds were put at his disposal to defray the expenses of a preliminary conference at which he discussed with Professors Buswell, Olson, and Travis the plans he was proposing and the committee personnel he was considering.

The upshot of these discussions on the part of the Board and of Professor Brueckner and his associates was the formal appointment, at the Atlantic City meeting of the Board, December, 1932, of the Society's Committee on Educational Diagnosis, composed of Messrs. L. J. Brueckner, University of Minnesota (Chairman); G. T. Buswell, University of Chicago; W. C. Olson, University of Michigan; P. T. Rankin, Detroit Public Schools; J. E. Stenquist, Baltimore Public Schools; L. E. Travis, State University of Iowa; and R. W. Tyler, Ohio State University. The Board also placed at the disposal of this Committee sums amounting in all to \$1100, in addition to the expenditures of the preliminary conference. The Committee has kept well within its appropriation and yet has been able to hold a number of extended and valuable sessions.

So much for the origin of the Committee and the formal relations of its work to the Board of Directors. With respect to its completed product, the Editor ventures to call attention briefly to certain features

that should be of interest to members of the Society and other readers of the Yearbook.

There has been a flood of literature, especially in the form of magazine articles, dealing with specific aspects of diagnosis. There has been, in response to this literature, an active prosecution of diagnosis and a very considerable amount of administrative overhauling and reconstruction of school and class organization, and an even greater number of activities and undertakings designed to remove obstacles and to facilitate progress in the school careers of individual pupils — consider the special schools, special classes, differentiated curricula, exploratory courses, ability groupings, intelligence tests, aptitude tests, achievement tests, performance scales, diagnostic charts, rating scales, remedial exercises, drill books, and all the paraphernalia of record-keeping and interviewing and conferring that these entail. What has often seemed to be lacking in this literature is a guide — if you like, a philosophy — to supply the meaning and to afford an orientation for these bewilderingly numerous school undertakings. This Yearbook, particularly in Sections I and II, will assist the reader in understanding the factors underlying diagnosis in general and will perhaps drive home the salient point that, if we are not to have a lock-step type of mass education, the only alternative in which we can take pride is an individualized education in which every reasonable effort is made to get to the specific learning problem of the individual pupil and then bring to bear upon it remedial action that will adequately meet it.

To those who feel that such a program is a hopeless one, that it is impossible of realization in practice, we may commend the suggestive account presented by Dr. Stenquist in Section V of what has even now been accomplished in one city school system.

In the body of the volume (Sections III and IV) there will be found a wealth of material that can be turned directly to account by the supervisor and the classroom teacher, whose concern lies primarily with the possibilities of educational diagnosis and remediation within a given subject matter.

The discussion of diagnosis in such familiar fields as arithmetic, English, and science traverses ground familiar to many readers; that of diagnosis in the social studies will probably enter terrain that is unexplored to most of us.

More novel still, perhaps, is the discussion of diagnosis as applied to such fields as health education, mental health, art, education for leisure, and the creative aspects of education. Confessedly, the ob-

jectives in some of these areas of educational effort are less well-defined; consequently both diagnosis and remediation are not so well developed as in the more conventional areas. Indeed, they are not by any means so easy. The editor is impressed with the service that the contributors to the Yearbook have done us, in this Section of the volume particularly, by showing the essential obscurity of many of the objectives with which the pages of courses of study nowadays are peppered — terms like ‘ appreciations,’ ‘ attitudes,’ ‘ insights,’ ‘ character,’ ‘ personality,’ and the like. It is precisely when the worker in education tries to measure the efficiency of a given educational activity in attaining such fine-sounding ‘ objectives ’ that he discovers that the propounders of these objectives are neither individually clear nor agreed among themselves as to what they are trying to produce and to measure. The Yearbook ought to serve a real purpose by stimulating precision and objectivity, and otherwise clarifying this cloudy educational sector.

G. M. W.

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INTRODUCTION

LEO J. BRUECKNER

Professor of Elementary Education, University of Minnesota
and Chairman of the Society's Committee

I. THE NEED OF EDUCATIONAL DIAGNOSIS

The committee on special education of the White House Conference on Child Health and Protection estimated that there are 3,000,000 mentally and physically handicapped children in the schools of the nation. These individuals are found at all levels of schooling, from the nursery school through the college and university. To mitigate or correct their faults and to transform these individuals from social liabilities into assets, in many cases a special type of developmental and remedial instruction is required. To this large number of handicapped may be added the thousands of children, mentally and physically normal, who are maladjusted socially, morally, or emotionally. Sheer educational neglect has resulted in the retention of this vast army of maladjusted children in the regular grades. The attempt to force these deviating children into a common mold has led to all sorts of mental and emotional twists and personality maladjustments that contribute to delinquency and social inadequacy. It is being recognized that the state must provide skilled instruction and treatment for these handicapped children as a matter of enlightened self-interest.

It is commonly recognized that many children who suffer no actual physical or mental handicaps are performing on a level considerably below their normal expectancy. Furthermore, because of inadequate stimulation many latent talents and special aptitudes are never given expression. The school must give as much attention to the development of these strengths as to the correction of deficiencies.

The school is the logical center for both skilled developmental instruction and remedial instruction. By developmental instruction we mean the provision for educative experiences that will lead to the well-rounded growth of all individuals. By remedial instruction we mean the types of corrective measures that must be undertaken to remove interferences and to remedy handicaps that prevent optimal growth.

II. THE MEANING OF DIAGNOSIS

Educational diagnosis relates to the techniques by which one discovers and evaluates both strengths and weaknesses of the individual as a basis for more effective guidance. Diagnosis is a logical process based on a consideration of all the available data concerning a particular individual or group of individuals. The analysis of these data and their interpretation in the light of knowledge gained from past experience enables the diagnostician to suggest necessary developmental or remedial measures. Diagnosis leads to prognosis; that is, to the prediction of the probable outcome of the condition.

The procedures of medicine suggest the approach to educational diagnosis. Much has been learned concerning the causes of physical disease; the symptoms of various types of difficulties have been carefully cataloged and verified; precise techniques for evaluating their severity have been devised; systematic studies have led to the discovery of means of preventing as well as of curing many diseases. Because of the large increase in recent years of mental disorders and emotional maladjustments that are intimately associated with the learning or growth process, medicine and psychology have given intensive consideration to their diagnosis and correction. Much less is known concerning the precise causes of mental disorders than about the causes of physical disease and malfunctioning. The future development of precise techniques for analyzing the symptoms of mental and emotional maladjustments similar to those that have been devised for the diagnosis of disease will make possible the discovery of the causes of these disorders, so that effective steps may be taken to develop corrective and remedial procedures. Considerable progress in the diagnosis of mental disorders has been made in the past few decades through the discovery of their close relation to disturbances in the physiological mechanism, such as malfunctioning of glands, toxic conditions, and diseases, like syphilis, that attack the brain centers.

The close relation between diagnosis in medicine and educational diagnosis is due to the fact that learning or growth results from the play of environmental influences, consisting of matter and energy, on the physiological mechanism. This mechanism has tendencies to act and grow in ways that are definite but that vary from individual to individual on account of differences in inborn, original nature. Physical growth is conditioned by the nutrition of the individual as well as by his inherited tendencies. The normal physical growth curve is affected

by environmental conditions, such as unsanitary living quarters, exposure to disease, lack of sunshine, and the like. Mental development depends on both the potentialities of the mechanism and the experiences in which the individual participates. Only when the sense organs receive correct impressions can correct connections be formed, provided that the impressions are transmitted in a normal way by the nervous mechanism. For example, correctness of visual imagery in reading depends on the correctness of the image transmitted through the eye. When the eye has defects, reading difficulties are likely to arise. Similarly, auditory defects lead to incorrect auditory ideas and hence to faulty speech. Not the least important causes of faulty connections of deep social significance are incorrect ideas transmitted from the printed page through the eye or false beliefs promulgated by propaganda transmitted through the ear. The effects of the many uncontrolled, often unwholesome, experiences that play on the physiological mechanism contribute just as definitely to moral, social, and emotional maladjustment as faulty nutrition contributes to physical deficiency. Society faces the double problem of devising methods of eliminating unwholesome physical, mental, emotional, and environmental conditions and of directing the educative experiences of youth into desirable channels.

III. EDUCATIONAL AGENCIES CONCERNED WITH DIAGNOSIS AND CORRECTION

In this developmental program the schools must take a major part. The school has long recognized the necessity of making special provision for the physically and mentally handicapped children, the crippled, the blind, and the deaf. Many schools now provide fairly adequate health service for all children. In practically all large school systems there are classes for the mentally retarded. Many schools have established classes for speech defectives. In recent years in a few cities there have been established child guidance clinics that deal with the child who is emotionally maladjusted or whose behavior reveals antisocial tendencies. These clinics coöperate with legal authorities in the study of factors contributing to juvenile delinquency. The rapid development of these special agencies that deal with aspects of growth formerly given little consideration by the school shows the extent to which the school is assuming some responsibility for the correction of maladjustments of all kinds that interfere with the optimal growth of all learners. All these agencies require the services of persons

with special types of training, some of them of a highly technical kind. In schools where these agencies are lacking, the teacher must assume the responsibility of dealing with the conditions.

The segregation of the physically and mentally handicapped in special classes and schools has greatly simplified the work of the teachers of pupils who do not fall into these categories. However, the wide range in the various abilities of pupils considered as normal and the differences in the rates at which they learn still present many problems. To reduce the range in the mental level of pupils in a grade, various methods have been devised for classifying them into more homogeneous groups, *e.g.*, on the basis of intelligence tests. In some schools the work of all groups is the same, save that superior groups complete the work in less time than the average or inferior groups. In other schools the work of superior pupils is enriched while the inferior groups study the "minimum essentials," during the same time. In other schools adjustments are made in methods of teaching. Other variations in time, content, and method are found in the schools.

Experience with ability-grouping has made it clear that all pupils of a given level of ability do not learn at the same rate and that marked differences exist in their interests, the difficulties they encounter, and the amount of practice they require in learning specific skills. Recent research has also demonstrated the unevenness of the level to which the various mental traits of a single individual are developed. The analysis of intelligence into its intellectual, social, and mechanical phases, as proposed by Thorndike, and the study of their interrelationships show that most individuals do not have the same level of capacity in all three aspects of intellect. For example, a child of superior intellectual capacity may be inferior in social or in mechanical intelligence; conversely, a child of high mechanical ability may be low in intellectual and social intelligence. Furthermore, from time to time, owing to the introduction of unforeseen factors, such as absence due to disease, injury, and the like, the growth of ability is retarded, so that when the child returns to school special adjustments of various kinds are necessary. Ability-grouping clearly does not eliminate the need of making a careful study of the growth of all individuals, especially if the whole personality of the learner, including his physical, mental, social, moral, and emotional characteristics, is to be given adequate consideration.

IV. CONTRAST BETWEEN MEDICAL AND EDUCATIONAL DIAGNOSIS

In certain important respects diagnosis in medicine and education are different. While diagnosis in medicine is to some extent concerned with the building of strengths, under ordinary conditions medicine is concerned with pathological conditions, with injury and disease. In educational diagnosis we are concerned with the analysis of all factors that condition or interfere with normal learning. An example of the differences in the points of view of medical and educational diagnosis is the ways in which the eye is considered in each case. The ordinary medical examination tests for acuity of vision and the presence of disease. This information is of course important in educational diagnosis. However, there are other facts concerning the eye that are very necessary in the diagnosis of reading disability, but with which the medical examiner is usually little concerned. Selzer,¹ for example, found that "over 90 percent" of the reading disability cases he examined had eye-muscle imbalance; that is, lack of balance of the muscles controlling the rotation and movement of the eyeballs. This condition makes for variability and uncertainty of perception of word forms that in turn lead to confusion and delay in the recall of words in reading. Suspenopia, momentary blindness in one or both eyes — and alternating vision — alternating periods of vision in one eye at a time — result in lack of visual fusion, which is one of the basal causes of faulty word recognition. These two conditions do not seriously interfere with the vision required for ordinary activities, but in such specialized tasks as reading they are severe handicaps. Two very common faults in reading; namely, reversals of words, as reading "ton" for "not," and alterations in the sequence of letters, as reading "framing" for "farming," are apparently associated with lateral dominance. Reversals are apparently associated with left-eyedness and left-handedness. Alterations are apparently associated with deviations from usual lateral dominance, such as ambidexterity of hand and eye, change of eyedness and handedness, and a combination of left-eyedness and right-handedness or of right-eyedness and left-handedness. Selzer believes that lack of visual dominance is also responsible for mirror-writing, stuttering, and other language difficulties.

Studies have shown the significance of the character of eye movements as a symptom of poor reading habits. When one realizes the

¹ L. N. Selzer. "Lateral Dominance and Visual Fusion." *Harvard Educational Monograph*, No. 12. Harvard University Press.

relationship between muscular control of the eye and the acquired ability to move the eye from left to right in short rhythmic movements, as is done in reading, the necessity of supplementing the ordinary medical examination of the eye by techniques that analyze these muscular controls is clear. Faulty eye movements in reading are not due to disease or other pathological causes of concern to medicine; they are in part due to muscular incoördination, in part to the operation of subtle factors, such as lateral dominance, concerning which we know relatively little. Inability to read may thus in many cases be due to ineffective controls of the eye rather than to lack of mental ability, the usual explanation of failure to learn to read. Thus, the medical man is little concerned with such aspects of learning as the nature of eye movements in reading, though that is a physiological element of great significance in educational diagnosis.

Medical diagnosis usually deals with a specific condition that can be described on the basis of past experience because of its similarity to other cases. The causes of a pathological condition are in many cases definitely known and prognosis is possible. The cause of a pathological condition is often quite specific; for example, it may be a particular kind of germ, the breakdown of some organ of the body, or some specific nutritional deficiency. Medicine has been able to isolate these factors and to devise corrective and remedial treatment for many of them. Diagnosis in education is faced with the problem of analyzing a unit of complex behavior to discover the influence of causes whose action cannot be observed directly. For instance, characteristics of eye movements can be noted, but the action of the controlling muscles themselves cannot be seen directly. An error in a performance like reading or spelling can be detected, but the behavior of the mental mechanism that led to the incorrect response cannot be analyzed directly.

Educational diagnosis deals with a process that is characterized by change rather than stability. The effects of each educational experience are many-sided, and they vary from individual to individual on account of differences in maturity, experience, and ability. The performance of an individual in any given situation depends on the operation of many factors, such as the degree of effort he puts forth — something that is very difficult for the examiner to control — his experience with similar situations, his understanding of what is wanted, the environmental conditions, and his interest in the activity. Our inability to control these factors and their extreme variability from

individual to individual make it very difficult to evaluate any ability. Variation in one or more of these conditions — for example, in effort put forth — results in a change in the individual's performance on a test if the same test is repeated. In all learning situations the mental and physical growth of the individual toward maturity — a continuous process of change in the growing mechanism — is an important factor. It is thus evident that educational diagnosis deals with a much more variable condition than does medical diagnosis.

V. BASES OF DIAGNOSIS

Just as the physician must have a well-classified knowledge of symptoms of various physical and mental ailments and a knowledge of the causes underlying them as the basis of his diagnosis, so the teacher should have a systematic knowledge of all types of learning difficulties, their symptoms, and causes in order to make a valid diagnosis of a pupil's failure to grow in desired ways at a satisfactory rate. Unfortunately there is lacking in education exact knowledge of causes of inability to learn, chiefly because in any learning situation there are so many elements that may contribute to disability. In spite of as carefully guided instruction as we are now able to give, there are pupils whose behavior reveals maladjustments of various kinds or who fail to master the subject matter and skills that are being taught. Formerly it was our practice to fail such pupils and require them to repeat the work. In recent years, many attempts have been made to meet this condition by using methods and materials that provide for individual differences.

Painstaking studies of learning difficulties and faulty reactions of pupils have made available a large amount of information helpful in educational diagnosis. We know that the native mental capacity of the pupil determines the level of difficulty of the tasks he can learn. This learning takes place through a physiological mechanism in which there may be deficiencies that interfere with effective learning. It has been demonstrated that glandular secretions, diet, and sunshine affect physical growth, but our knowledge of their effect on normal mental growth is vague. Many of the difficulties in learning are undoubtedly due to inadequacies of the materials of instruction, ineffectiveness of methods of teaching, and failure to consider individual differences. Faulty pupil attitudes toward the work of the school grow out of distaste for the work, failure to progress satisfactorily, and unwholesome personal relationships between teacher and pupil. While the school does try to

develop worthwhile social traits and attitudes of the pupils, in many cases little actual progress is made because of the undirected, and sometimes harmful, influence of environmental agencies that the school can at present do little to control.

In any single learning situation all these factors are operative in varying degrees, and it is practically impossible completely to isolate the effects of any one of them by the analytical techniques we now employ. Any diagnosis may be incorrect because of the inability or failure of the examiner to recognize the signs or symptoms of the deficiency or because of ignorance of fundamental facts concerning learning. The examiner may lack knowledge of the factors underlying the learning activity involved and of ways in which they operate or are related; he may use techniques and devices that are inadequate, careless, and unscientific. The conditions under which the examination is given may be unfavorable or may be inadequately controlled, so that the responses the pupil makes may not be those that he typically makes in the ordinary activities in which they occur, with the result that an incorrect appraisal is made; the basis on which the diagnosis is made may not be sound, owing to the fact that important items, such as some physical deficiency, may have been overlooked. Nevertheless, if teachers use reliable objective techniques of diagnosis, they can in many cases readily determine the elements in the learning situation that they should control or correct.

VI. THE TECHNIQUES OF DIAGNOSIS

Diagnosis in medicine has been greatly facilitated by the use of objective methods of defining, analyzing, and evaluating symptoms. Where formerly the physician based his diagnosis on cursory examinations with the eye, ear, and hand, he now uses instruments such as the ophthalmoscope to aid the eye, the stethoscope to aid the ear, and the X-ray to aid the hand, for example, in the evaluation of fractures. The use of instruments of precision insures accuracy of measurement of blood pressure, temperature, and movements of the heart, body, and muscles. Chemical analysis, microscopic study, and bacteriological examination increase the reliability of diagnosis. Various types of immunity tests, such as the Schick test for diphtheria, and tests for idiosyncrasies, such as hayfever, show the possibility of diagnosis of very specific conditions. All these techniques of medical diagnosis have their place in the study of the individual.

In comparison with this medical diagnosis, it must be admitted that