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EDUCATIONAL IMPLICATIONS
Based On a Study of the Method of Analysis—

Herbert A. Clugston

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FOREWORD

The article, EDUCATIONAL IMPLICATIONS, contained is this bulletin was written by Dr. Herbert A. Clugston, who is presently Dean of Academic Administration and instructor of psychology at the St. Cloud State Teachers College. He received his Ph.D. degree from the University of Colorado.

In the words of the author the article "attempts to show briefly how the shifting conflict between structural and functional attitudes is influencing classroom teaching . . . . . how to functionalize method and still maintain thoroughness of instruction, adequate evaluation, disciplined behavior, and so forth."

—FLOYD E. PERKINS

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Educational Implications

Based on a Study of the Method of Analysis

Herbert A. Clugston

Analysis forms an integral part of any complete act of thought. Objects and events, the materials of thought, must be broken down into smaller units and their interrelationships and their relations to the whole must be studied before thinking can proceed. This is the method of analysis. The process involves more than mere fractionalization. Analysis implies recognition of relationships. The procedure is different and the results are different when elements are studied separately and when they are studied in relation to a meaningful whole. It is this difference which has provided the setting for the conflict in analytic procedure, and it is this conflict which forms the continuity around which any study of the method of analysis must be developed.

The terms "structural" and "functional" differentiate conflicting methods of analysis but they do not refer to specific methods of attacking specific problems. They are interpreted as meaning "types" of analytic procedure. They define the frame of reference within which analysis is made. Analysis made within the structural frame of reference tend to view objects of study more or less as independent variables, entities, irrespective of their dependent relationships. Analyses made within the functional frame tend to view objects of study as dependent variable, wholes, respecting dependent or functional relationships. These two concepts have contended for supremacy throughout history. Education has not escaped. Its methods, its philosophy, its practices have been determined in no small degree by the dominant concept. A study[1] was made which attempted to trace the development and influence of this conflict in the fields of philosophy, physics, biology, psychology, and education. The following implications for education are the result of this study.

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[1] Clugston, Herbert A., **History of the Conflict Between Structural and Functional Types of Analysis in Educational Research.** Unpublished doctor's dissertation. Boulder: University of Colorado, 1941.

Note: Although this study was concluded a decade ago the educational implications derived from it were prophetic. Current literature in psychology and education indicates that practice is becoming progressively more functional. These implications are presented here to encourage those who read them to persist in their efforts to improve educational practice.

A. Methods of Research

1. Method versus methods

A method is a way of doing something—a mode of procedure. There is no patent or invariable way of doing anything, but, obviously, there are better or preferred ways. A preferred method is the most effective way of reaching a desired goal or accomplishing a definite task. Effectiveness may be determined only by evaluating the results obtained when the method has been used. Furthermore, a preferred method is frequently a combination of methods. The question may be raised justly whether there is not general method which has many aspects rather than numerous specific and distinct methods. Here, again, is the conflict of viewpoints. When emphasis is placed upon structure the elements of research methods stand out and more or less discrete methods appear. When emphasis is placed upon function they tend to disappear or to become secondary in importance, at least.

During the growth of the scientific movement there was a tendency among writers on research methodology to fractionalize method to a high degree and to draw sharp lines of distinction between the resultant methods. But, however, classified for purposes of definition, methods must be regarded as continuous, not as discrete when they are being employed. Even the highly specialized experimental method is not entirely devoid of the deliberative, the integrative, and the analytical, particularly. While this is a matter of theoretical rather than practical concern, in the main, it is significant insofar as such a point of view constitutes a safe-guard against the tendency to curtail results through an attempt to use too limited procedures —as has been the case so often when either extreme of the conflict has prevailed.

Furthermore, good methods grow, they are not created. Method as it is found today is the result of the age-long quest of many after truth. The methods that survive are, generally speaking, the methods which man has found most effective in accomplishing the results desired. In other words, the functional value of a method determines its survival and the direction of its development. Methods evolve as materials and problems change and as goals become more clearly defined. A good method is a flexible procedure and not a rigid rule of action, derived and defined **a priori.** Under the latter, method would remain static and become increasingly less productive—nonfunctional. Under the former, method grows—evolves—and becomes increasingly more effective of desirable results, more functional. Hence, a good research worker will adapt current methods but will be exceedingly cautious about **adopting** any one of them in seeking the solution for a particular problem.

2. The value of classification

Classification is a form of comparison. When objects, events, or procedures are recognized as possessing common characteristics they are grouped into a class and given the same name. This classification makes for economy in handling knowledge since systematized knowledge is easier to grasp

and retain. Furthermore, the discovery of the marks of identification introduces one to a vast amount of knowledge about the individual members of the class which one might otherwise overlook. Each attempt as classification or dealing with classifications furnishes a first step toward improvement of one's knowledge through the discovery of new facts. Finally, classification enables one to generalize about classes, for example, to discover and formulate their characteristic ways of acting. The value of these generalized formulas lies in the provision of economical ways for making knowledge more secure. It may be well to note here that a generalization is not invalidated when an exception is discovered provided there are not too many. Classifications with their generalizations are not invariable and ultimate, always. They do provide organization and systemization upon the basis of which advancement may be made.

Classifications of research methods are no exception. There have been many attempts to classify them and, frequently, pronounced dogmatism concerning their relative value has dominated educational research. There has been a tendency to regard as "sacred" certain methods, notably the experimental method, and make all else subservient and secondary thereto. This has been accompanied by a tendency to deny certain other methods the right to be classified as a research method, particularly the deliberative. Failure to sense the unity in research methodology is to blame. There are as many arguments available to support the contention that the experimental serves the deliberative as the contrary. But when method is regarded as a whole with many functional aspects such contention is not necessary. The question then becomes, "Is this a useful aspect of method?" rather than, "Is this procedure entitled to be dignified as a method?" Whether or not analysis, deliberation, experiment, and the like constitute valid research methods is less important than the discovery of the role these various procedures play in research and how they may be improved. On the other hand, the various attempts that have been made to classify research methods have been valuable in that subjecting procedure repeatedly to rigid analysis and formulation tends to result in a refinement of available methods. Classification and definition of different research methods is not an end but rather a means to a more complete understandng of method in general.

3 Scientific method

a. What is knowledge

The goal of all research is knowledge. Knowledge may be classified as (1) common-sense knowledge, (2) scientific knowledge, and (3) philosophic knowledge. The point must be made emphatically that the difference between them is relative rather than absolute. Common-sense knowledge may be possessed by any one as a result of simple, non-critical observation. Scientific knowledge is similar but carried to a higher degree of correctness through more critical examination. Such knowledge tends to be narrow - specific to a particular field of interest. "Science" is a method but "a science" is an organized field of knowledge procured through scientific methods. Each science interprets facts and problems largely in the light of its own organiza-

tion. It has been observed that "theoretical" physics, "theoretical" biology, and the like have arisen to meet this demand, to make scientific knowledge more functional.

Philosophy is a synthesis or correlation of knowledge and experience occasioned by the necessity of solving a problem. It is the "master science" which unifies the findings of the several sciences, correlating the truths of a particular science with the truths of other sciences or the whole body of truth. It examines critically the assumptions and hypotheses of the sciences, analyzes the principles upon which they are founded, and evaluates their concepts. In its criticism of the method and results of the sciences it does not seek to amass new facts, as such. It seeks rather to determine the meaning of known facts, by "thinking through" all of their implications. Philosophic knowledge, therefore, is scientific knowledge made more meaningful and hence more useful through interpretation based on a wider organization and integration of knowledge.

There is no attempt here to deliniate between science and philosophy. The difference between them is relative, a difference in degree rather than kind or, perhaps more accurately, a difference in premise. If the facts that have been interpreted according to this wider organization are scientific, that is, accurate, it follows that the resultant knowledge is scientific provided the method has been critically accurate. To this method has been given the name "deliberative".

The attitude one has toward the definition of knowledge will condition one's attitude toward research methodology. If one accepts the more limited view that knowledge is a collection of discrete facts, countable and measurable exactly, then one must accept the more limited view of method. If one believes that there is knowledge which consists not so much in quantitiative facts amassed as in qualitative evaluations and interpretations of the facts of science and the experience of man, then one must recognize as valid methods for synthesizing, evaluating, and interpreting these facts more exactly. These methods, because of the nature of the data yielded, are called "qualitative" methods, or aspects of method, as distinguished from "quantitiative" methods which yield quantitiative data.[1]

Every man evaluates and interprets the facts of experience. Common-sense interpretation—correlation of knowledge and experience—is as prevalent as common-sense knowledge. The process is inevitable. Its soundness depends upon the procedure employed. The refinement of qualitative methods is intended to do for common-sense interpretation, evaluation, and synthesis, in the interest of greater accuracy and dependability, what science has done for common-sense knowledge. Hence it is observed that one's concept of analysis may govern one's definition of knowledge and one's definition of knowledge may, in turn, determine one's attitude toward research method.

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[1] Robert A. Davis (editor), **Methods of Educational Research** (Boulder: University of Colorado, 1931, mimeographed.)

Structural analysis yields **particulate** quantities of knowledge as a rule, hence the more limited concepts of method, whereas functional analysis permits and encourages the broader view, hence the more liberal definition of method.

b. Is a scientific method possible?

One great ambition has motivated the endeavors of twentieth century educators, namely, the development of a science of education, the methods of which should be scientific. Science was conceived in terms of nineteenth century biology and developed in conjunction with a growing physiological psychology. Educational statistics and objective tests and measurements were the result, and experiment became the prinicpal method. All subjectivity and all methods that did not adhere to this conception of a science of education were discarded. It was an age of atomistic-mechanism predominantly.

Recently, disillusionment has settled over the educational camp. Science and scientific method has not worked the miracles that had been hoped for. Educators and psychologists had overlooked certain factors such as; man is a whole being and his members and functions cannot be segregated into particles for rigid analysis and experiment without distorting the truth; man is a member of a complex society which is a functioning unit. Physics and biology had had the same rude awakening and psychology had been struggling with the organismic problem. It is not strange that educators have begun to wonder—is a scientific method possible?

The question cannot be answered completely here, nor can a complete reformulation be suggested. The latter is already definitely under way. The question should be—what sort of scientific method is most suited to modern needs and conceptions? Method must be scientific if by that is meant accurate, unbiased, complete. It must not be qualified by such narrow and limiting conceptions as have prevailed.

Physics has not discarded scientific method in developing the new quantum theories and probability mathematics. Biology is no less scientific under the organismic concepton than it was in the nineteenth century. If such drastic steps were deemed necessary in these two established fields then educators should not feel that scientific method is impossible in the event that modern education continues to follow the functional trend. It means rather, that qualitative methods will need to be developed further and employed more widely and the meaning of the term "scientific method" broadened to include them. If this step is not taken then it is conceivable that education must cease to be called a science. Scientific method consists not so much in adherence to certain specific and unalterable mechanical procedures as in an attitude toward truth, a way of regarding problems and their solution by whatsoever means is available and best suited to the demands of the situation. In attempting to be "scientific" education has often been exceedingly "unscientific".

C. What is the outlook for experiment and statistical procedure?

Does this mean that education is about to forsake experiment and return to uncontrolled observation? Does it mean that statistics and objective measurements will no longer be needed? Not at all. It means, rather, that such extensions of these instruments of scientific method must be made as will enable them to meet the demands of the newer conceptions of education. Under a mechanical philosophy of education in which part processes are regarded separately and wholes are conceived as summations, experimental procedures tend to be mechanical and artificial. They seek to abstract the elements which are to be studied, and to control or rule out the others. The conclusions thus reached often fail to perform as expected in non-experimental situations. The reason is obvious—wholes cannot be so easily disturbed without disturbing their fundamental nature

It is not necessary to dispense with experiment. It is too valuable as a procedure. But, as experimentation with animals yields ground to experimentation with humans, and as laboratory experiments with single variables rigidly controlled under artificial conditions are yielding to classroom experiments carried on under conditions as true to life as possible, so the development may be expected to lead into broader areas of social experimentation where the single variable technique is frequently inappropriate. It may mean dispensing with some of the statitistical niceties that have paraded as research so often but which have only cloaked the meaningless of the endeavor. Where appropriate, controlled experiment employing the single variable, statistically treated, will and must continue to be used. The new education for the complex, democratic American way of life cannot be fully investigated if that way of life is disrupted. Experiment, therefore, must also be long-time, more loosely controlled, more critically observational, and interpreted in terms of true-life situations.

Whereas the results of experiments have most often been expressed in statistical terms there is a tendency now to resort to judgments rather than such statistical devices as criterion scores. It is doubtful if attempts to treat complex situations by means of vectors (Lewin) and topology (Brown) will ever be of any great practical value. They accomplish very little that cannot be said just as well in plain English. Borrowing from physics concepts that are useful therein and attempting to force them into a socially dynamic frame appears not to gain much in understanding. Wearing the cloak of science does not make a scientist. Education will not suffer loss of prestige by being intensely practical. Experiment and statistics must be made useful and practical in the classroom and in society to survive. They cannot survive by basking in the reflected glory of mechanical and abstract research.

d. Is there an analytical method?

Research workers, in their endeavor to classify research method, have asked whether or not analysis is unique enough to be given place as a method of research. This question cannot be answered finally by a simple "yes" or

"no". It depends almost entirely upon the stand taken with reference to the conceptions discussed earlier in this article and to what degree it is considered desirable to carry the analysis of method.

Bluntly, in keeping with that point of view which seeks to reduce the basic classifications to as few and as broad categories as possible, the answer here is going to be "no". Justification could easily be made for answering "yes", on the ground that many problems demand just such a specific procedure as that which has been called "the method of analysis". The procedure can be reasonably well patterned and its means for gathering data are well developed. However, conceived in this manner, analysis becomes very narrow and limited. True analysis permeates all research, all thinking. Man analyzes and selects momentarily throughout life. There is also a relationship phase to analysis, and analysis which loses sight of the relations between elements or factors is blind. Hence, this more limited definition, one which resolves the method into a mere process of fact or datum enumeration, is not adequate enough to warrant granting it a special category.

The patterns of analysis, as employed around 1928, and as classified by Charters, Monroe, Harap, and Rugg can readily be grouped as follows: (1) Activity and job analysis, (2) Analysis of child reactions; likes, dislikes, interests, abilities, and the like, (3) Analysis of child and/or adult needs; personal and social needs (a) as felt by child, (b) as observed by adults, (c) as determined by experience; present and future need and (4) Analysis of the child's problems as a basis for diagnosis and guidance. This, while dealing mainly with conditions essential to curriculum making, is a fairly representative list of the types of analysis required in educational investigations. Of course, there are untouched areas such as; analysis of physical facilities and requirements for building, analyses essential to wise budgeting, and the like. In fact, analysis is necessary before most projects are undertaken. The steps usually are: (1) Determine what facts are needed; (2) Determine the best sources available from which these facts can be secured—sources may be direct or secondary; (3) Determine the best procedure for securing the facts from these sources—the technique most suited to data required; (4) The analysis; securing the facts—requires "breaking down" the sources to find the desired facts; (5) Assemble and classify the facts. Such analysis ends when this last step is taken.

Analysis which is blind counting is practically worthless. The elements, whatever their nature, bear some relation to the whole and to each other. Taking note of these relationships is vital to the significance of the derived information. One's attitude toward the whole will influence one's attitude toward the meaning of the parts and their relationships. Hence, analysis must not be purely structural in character. But, functional analysis is carried on within a definite frame of reference and its data are relative. This means that it is descriptive of conditions within that reference frame.

It would appear from the foregoing that analysis is, in reality, a phase of description. Even counting in order to determine content, as in textbook analysis, has a descriptive quality, at least implied; it is an attempt to describe content. On the other hand, a survey which employs standard tests to arrive

at a description of the schools in a community is partially analytic. So, to classify analysis under the descriptive method is not inconsistent, but to insist that analysis stand alone could tend to limit its more complete functioning as well as emphasize its mechanical features. Present-day tendencies do not encourage too complete abstractions. The frame of reference must be retained to protect the meaningfulness of the abstracted elements, whether techniques or knowledges. The more functional analysis becomes the more descriptive it is and hence the more justification there is for its being classified. Purely structural analysis scarcely warrants the dignity of a special category of its own. It is, rather, a technique for gathering data.

4. The outlook for research

Research in education is here to stay provided it can justify its cost in time, effort, and money. To do so it must produce results in actual school situations. It is not enough to refine methods of collecting data that cannot readily be translated into improvements in the practical affairs of education. One of the criticisms leveled at research is just this lack of capacity to produce needed functional changes. The reason is that research methods are too abstract, too artificial, too mechanical.

There is a difference between "scientism" and "scientific method". Research workers have only too often become so engrossed in the fine points of their procedures, almost to the point of fanaticism, that they have become worshippers of the means and have lost sight of the ends. That is scientism. The true scientific spirit is an attitude of mind, a way of life. It is bound to no specific procedures or devices. It employs whatever method accomplishes most accurately, most economically, most efficiently the task at hand. This is scientific method. The more limited view of science as applied to educational research must yield to the broader view or research will be cast out as cluttering the pathway of progress. Those methods will survive that meet the criterion of functional value.

B. The Philosophy of Education

1. The philosophical heritage of the present century

Study has shown that the interrelationships of many factors and many areas of knowledge have influenced the trend of educational development. This is true because life is not partitioned. It is one fluid, continuous stream of events. But, in the course of development, areas of knowledge have been particularized for the sake of efficiency in comprehending and handling them. Events and facts have been abstracted out of these areas for the same reason, and so on until the fractionalization process has reached the minutest elements. These elements have been elevated to first rank importance and original unity has been forgotten. This was the status of scientific and philosophic knowledge when the nineteenth century ended.

Educational philosophy reflects current patterns of thought, hence the dominant pattern to which the twentieth century fell heir was predominantly

structural. The philosophy and psychology of James and Dewey fell upon unreceptive minds, which were incapable of understanding it until the pattern had shifted in keeping with the general flow of reflective events. What was the pattern of philosophical thinking in education?

a. Erudition—knowledge for knowledge's sake

The mark of an educated man for centuries had been the quantity of his knowledge. Because the common man had so little need or opportunity for securing knowledge he looked with awe upon the man who knew. Parents who could afford it sent their children to school so that they too might become erudite. It mattered little for what this knowledge might be useful. One goal for education which still had great force at the beginning of the twentieth century was erudition—knowledge for the sake of knowledge.

b. Mental discipline—the training of the mind

Faculty psychology had been a source of contention in the nineteenth century but its hold could not be broken entirely. Even after it became evident that mind was not a composite of unrelated faculties, the idea that the mind could be trained through vigorous exercise could not be shaken. This idea still persists, often unwittingly, in educational circles today. Requirements for degrees are advocated frequently on the ground of their disciplinary value.

Teachers, swayed by this philosophy, employed materials and methods best suited to such exercise. Curriculum makers determined content and organization by the criterion of the development of a strong and sturdy intellect. Certainly, this philosophy was functional within its narrow reference frame even though only the strong survived and, in the light of modern psychology, it was fundamentally unsound. In the broadest sense, as learning is now understood, it was a grossly structural philosophy. Nevertheless, one of the goals of education forty to fifty years ago was mental discipline—the training of the mind.

c. Preparation for adult life and for college entrance

The child had not yet come into his rights. He was still very much misunderstood. Child nature had only begun to challenge psychological investigators. Rosseau, Pestalozzi, and Froebel had made a beginning from a philosophical and human interest point of view. Unfortunately, child psychology was born in an era of structural, physiological emphasis in psychology. The child became an object of study rather than a subject of concern. He was regarded as a synthetic creature rather than as a dynamic organism with feeling, thinking, and behavior peculiar to his stage of physical, emotional, and intellectual development.

Content and method were selected and developed, not with reference to existing functional needs, interests, and abilities of the child but with reference to what he would be when he grew up. The child was regarded as a miniature adult. This was the pattern for all children. For the few who survived the ordeal and whose parents could afford it and who desired to continue into the secondary school, preparation for college entrance became a dominating factor in their education. The question of appropriateness of curriculum content and methods to adolescent nature did not concern late nineteenth and early twentieth century educators. In fact, even now, that concern is just beginning to be given serious consideration by administrators and secondary school teachers. A third goal of early twentieth century education was preparation for adult life for all and preparation for college entrance for the few.

2. Education is life—the child is a growing, dynamic, goal-seeking organism

The challenge of Dewey's philosophy was one of the principal factors in changing the course of the development of twentieth century educational philosophy. The philosophy which Dewey advocated was a resurgent expression of the philosophy of wholeness and dynamic development, the philosophy of change. He was the chief exponent in psychology and education rather than the sole originator of the modern expression of that philosophy. He reflected the restlessness of the more resourceful thinkers in all fields of knowledge under the static influence of an atomistic-mechanistic conception of life.

Physics and biology had broken ground and the rather latent nineteenth century philosophy was beginning to be aroused by a new challenge. The increasing complexity of life, the expanding horizon of knowledge, the developing accuracy of available instruments and experimental techniques were fast rendering the static approach untenable. Psychology was soon to fall in line. Structural psychology gradually, however, reluctantly, is yielding to functional psychology in its broader definition. Organismic concepts are rapidly replacing structural concepts. The child can no longer be regarded as as assembly of parts and part processes. The child is coming to be regarded as a growing, dynamic, goal-seeking organism with abilities, interests, needs, and dispositions peculiar to his stage of development and circumstances of life. Education is coming to be regarded as synonymous with life. It is living as well as preparation for living.

3. A social philosophy of education

The uniqueness of the American way of life has been dawning upon modern educators more, perhaps, than at any other stage in its development. Complex social interrelationships demand a higher type of citizenship. Challenges from totalitarian nations have caused Americans to reevaluate their democracy. They are more sure than ever that the democratic way of life is the only satisfactory solution for the problem of a complex society. They are certain that education in a democracy has an inescapable role to play in perpetuating and perfecting that way of life.

Psychology has pointed repeatedly toward the problem of individual differences. Whether they are innate or cultural in origin matters little; they are probably both. In a democracy, they represent a challenge and a responsibility for education. Equality of opportunity in keeping with the individual's abilities and dispositions is the ideal. And it is the individual as a citizen which concerns education most in this connection. Education has a social aspect, a social responsibility, as well as an individual one. Education is and must be centered in the life of the child but it must also be centered in the needs of the society which fosters and protects that child. So modern education must have a social philosophy as well as an individual philosophy.

4. The outlook for a philosophy of education

The future development of educational philosophy will be contingent upon the outcome of present chaotic world conditions. If the democracies prevail there will, without doubt, be a continuation of present trends—the blending and further development of both individual and social goals and a more complete functionalization of the educational program. Totalitarian methods must, of necessity, be static and mechanical. Free growth and natural change are inimical to dictated social control. Democratic mehods, when given full, intelligent expression, are favorable to functional, dynamic growth and development. Functionalism is both an outgrowth of and a contributor to the devolopment of a democratic way of life. It flourishes best in an atmosphere of socialized, democratic freedom.

The sciences, including psychology, appear destined to continue their functional development. The increasing demands of practical necessity will keep them, for some time to come, from lapsing back into their purely academic self-complacency. And, now that the artificial barriers separating science and philosophy are disappearing the development of the theoretical aspects of the sciences, as well as their more technical aspects, will continue. Educational philosophy cannot help but reflect this newer aspect of scientific development. Hence, it may well be anticipated that the philosophy of education will assume an even more important role than formerly in the progressive integration of the structural and functional points of view in education.

C. The Curriculum

1. The aims of education as expressed in the curriculum

The goals of education, as reviewed in the discussion of the philosophy of education, become a very practical problem in curriculum making. Under the so-called traditional point of view they were not difficult to attain in and through the curriculum. As they have developed in recent years, curriculum making has become a much more difficult undertaking. Knowledge is still an important outcome of education; intellectual efficiency must be developed through the acquisition of appropriate techniques; there are still the mature stages of life to prepare for; but these traditional aims take on a radically different meaning under the functional approach. In addition individual and social development must be provided for.

Aims must be general enough to apply at all levels with all groups in all areas. They must possess that quality of universality which will enable them to function in keeping with the organismic conception and a social philosophy of life. Endless fractionalization of aims to meet every possible situation appears to be unnecessary and even dangerous, in that it often leads to confusion or routine mechanization in teaching.

There will be, of course, certain special or particular aims reflecting the needs, interests, abilities, and the life, of children arrived at by means of a careful analysis carried on within a frame of reference that recognizes the whole child as a social being.

2. The organization of the curriculum

The curriculum must be organized as a flexible unit. It must be flexible to meet the demands of individual differences and a dynamic growth concept. It must be a unit to preserve the wholeness of the experiences of life.

Subjects and subject matter have been the center of controversy for some time. The traditional organization of the materials of learning into subjects has been challenged on the ground that it was unnatural, tending to break experience down into small, unrelated segments, losing sight of the unity of experience. Attempts have been made to organize curriculums on an entirely different basis. Subject matter was not to be taught as such but was to be brought in incidentally in the study of some area of living, theme, life function, or the like. This question has not been settled at present. The tendency appears to favor retention of subjects, not as the sole or even the chief basis of organization, but in order to preserve their value. Subject matter should be used as a means rather than as an end in itself. The tendency to depend upon textbooks alone has yielded to the employment of a variety of techniques and materials most intimately related to the childhood experience.

The functional approach to curriculum organization appears to be gaining a firmer hold at present. Agreement has not been reached concerning the exact nature of the organization but there is considerable talk about "units". According to Harap, "The unit of learning appears to be a complete and coherent learning experience having a purpose which is meaningful to the pupil, accepted as his own, and which is closely related to a life situation."[1] Not all will go so far as to say with Harap that the basis of the unit is experience rather than subjects but the tendency is to favor some form of unit organization which will retain the essential unity of experience. Whatever the conclusion reached may be it is safe to predict that traditional, piecemeal learning of isolated facts in a carefully and rigidly partitioned school day will disappear. Furthermore, it is safe to predict that "subjects" will not be lost entirely although their importance may be greatly diminished. Organization will be determined largely with reference to the functional unity of the experiences of life.

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[1] Harap, Henry (Chairman) - **The Changing Curriculum.** (New York - D. Appleton - Century Co., 1937), P. 77.

3. Method

The twentieth century inherited a structural conception of the process of learning and its concomitant routine, mechanical method of teaching. Associational psychology, learning by connections, stimulus-response bonds, reflexes and conditioning were some of the concepts which characterized psychological thinking and formed the basis of method. To say the least, method, so conceived, was highly mechanical and non-functional with respect to experience regarded as a unit. Method was largely a matter of routine, recitation, drill, memorization, "stamping in" through frequency, recency, and so forth. The element of purpose was lacking in learning. Functional psychology and the concept of organism demands that learning be regarded as a continuous stream of more or less purposeful activity in which meaningful situations replace isolated stimuli. Reflexes become pure abstractions and cannot be the basis for learning, and conditioning is but one aspect of a complex process. The organism as a whole responds to purposeful situations, and specific responses are emergents from original mass reaction, aimed at relieving the tension aroused by the demands of the situation. It is clear that a mechanical theory of learning does not explain such dynamic experiences.

Method involves socialized activity, planned experience, problem-solving, and reflective thinking in meaningful situations. The teacher no longer dominates a passive learner who gropes his way, blindly, through a meaningless mass of isolated facts. The teacher is a guide who watches over the learner, advising, suggesting, encouraging his self-activity in a situation reflecting true-to-life experiences framed in terms of the child's understanding, needs, and interests. The child is constantly aware of his relation to the materials of learning because they have meaning for him. Method has, as its goal, learning that will function in the life of the child now and in the future, as an individual and as a member of a democratic society.

The question naturally arises—Is there not danger of going too far? There always is. Extremes are dangerous. In certain quarters tradition-phobia appears to be a greater threat to the success of education than the tradition-bound curriculum ever was. Moderation is always the mark of true progress. Traditional structural-physiological psychology was not all wrong and methods growing out of it were not all bad. Many of them were, and still are, effective. For example, there has been a strong reaction against drill. True, drill is mechanical in nature. But drill is effective, particularly when that drill has meaning. Drill can be functionalized, can be made purposeful. It need not be blind, automatic repetition, in fact, it must not be, if it is to be of value in learning.

Memorization has come in for its share of criticism. Rote learning of factual material is avoided entirely in many modern schools. Learning of this type is certainly non-functional in the broadest sense, and should not be a major schoolroom procedure. But, rote learning is often the most effective means available for mastering certain materials. Pupils should understand that true-to-life conditions contain many distasteful but necessary experiences. The football teams would rather scrimmage than drill on fundamentals

or memorize plays and signals. Certainly, no coach would depend upon drill and rote learning alone to develop a team; neither does a successful coach minimize their value. But scrimmage, fundamentals, plays, signals, and rules are all essential aspects of good coaching. Some "progressive" teachers would fail dismally if they employed their classroom methods as coaches. Perhaps they are failing dismally, if the full truth were known. The only reasonable conclusion is that when structural, mechanical methods are indicated, they should be employed; when functional, dynamic methods are indicated, they should be used. The two approaches are not irreconcilably incompatible. Through all, there must be meaning and understanding rather than blind obedience, willingness rather than compulsion. In the final analysis, the method is often less important than the spirit in which learner and teacher employ it.

The study throws very little light upon learning by parts or by wholes. One could become highly enthusiastic over the concept of wholeness and berate fractionalization of the materials of learning as belonging to the era of atomistic-mechanism. But even a cake must be cut before it is eaten. It would be utterly foolish to cast off learning by parts. The important consideration is that the learner should understand the interrelationship of the parts and their function in the whole, to the extent that such is possible without breaking down the whole, before he concentrates upon learning by parts. The danger in part learning is that the learner will fail to sense the functional unity of the whole. The danger in whole learning is that the learner will have a superficial regard for the whole. Whether or not the one or the other should be used will depend upon the learner, the demands of the learning situation, and the nature of the materials of learning. Certainly, there can be nothing inconsistent between a fractionalized school situation and learning by parts when the proper perspective is maintained.

Motivation, as conceived in a functional curriculum, does not consist of such detached and isolated devices as have been employed so commonly in the classroom. Motives, such as teacher fear, school marks, and the like, are extrinsic to the learner. They do not enter into and form a part of any self-initiated plan of action. Learning thus motivated lacks the quality of purpose. It fails to result in any broadly functional behavior. Such a restriction in viewpoint is the result of the teacher's failure to consider the total picture. She has been too much concerned with attaining a limited, specific objective. Public criticism of the work of the school charges that it does not carry over into life. The functional curriculum has been attempting to meet this challenge, in part, by broadening the concept of motivation. A motive is established in consonance with an existing or created interest, need, or desire of the child. The child assists in determining a plan of action to reach that goal and satisfy the motive. Together, the motive and the plan constitute the child's purpose since either, without the other, lacks purpose. Purposeful behavior has meaning and meaning insures a higher degree of retention and application of the results of learning. It is clear that motivation, applied from without, limited in significance, and devoid of a plan of action, must be regarded as non-functional except in a very restricted and often harmful manner.

This section on method has attempted to show briefly how the shifting conflict between structural and functional attitudes is influencing classroom teaching. The functional attitude is confronting teachers and educational psychologists with a very practical problem—how to functionalize method and still maintain thoroughness of instruction, adequate evaluation, disciplined behavior, and so forth. The final answer to this problem has not been given.

D. General Conclusions

1. There has been a cyclical conflict throughout the history of human thought between structural and functional types of analysis, a tendency to premise thinking on structural elements as primary as opposed to wholes as primary with elements as derivatives.

2. The cycles have been narrowing in recent centuries and a tendency appears destined, at the present time, to bring the two into closer harmony as realization of the nature of the conflict becomes more apparent.

3. The prevalence of the one or the other extreme has tended to dominate philosophical and scientific thinking and to result in attitudes and practices compatible therewith. The structural type results generally in static, atomistic, and mechanistic ways of thinking and acting whereas the functional type results in dynamic, unitary, and meaningful patterns. Both have their valuable contributions to make. The important consideration is awareness of the dominant pattern and evaluation of the results of thinking accordingly.

4. Research methods have been particularly responsive to the dominant pattern. Controlled experiment employing the single variable technique, statistical devices, and objective measurements, prevail under the structural attitude. Failing to realize the nature of their reference system, investigators have tended to generalize too freely from abstract data. Furthermore, the data so derived are not always true to fact. There is a greater tendency, when functional attitudes prevail, to emphasize the more qualitative aspects of knowledge, but also a tendency toward superficiality. Research needs to consider carefully the consequences of the two attitudes.

5. The "method of analysis" is scarcely broad enough to warrant a separate category in research methodology. It is more properly regarded as a technique for gathering data pursuant to a descriptive study. "Analysis" as generally employed has a definitely descriptive connotation.

6. There is a fundamental difference between "scientific method" and "scientism". Educational investigation, following the structural attitude, has tended toward a narrow, limited scientism. Results have suffered proportionately, many of which, if not most of which still control psychological thinking as applied to education. It is difficult to shake the confidence that has been placed in the results of abstract experimentation; e.g., many isolated drives, determined by controlled experiments with children and animals under artificial conditions, are supposed to set up tensions which resultant activity seeks to remove. When the organism is viewed as a whole

under normal conditions such explanation appears to be open to question. Scientific method, on the other hand, is an attitude toward truth and its derivation. It is not bound by restricted procedure but demands accuracy and completeness, broadly conceived.

7. The philosophy of education is determined by prevailing thought patterns. Structuralism tends to result in a limited and limiting philosophy whereas functionalism tends to broaden the scope and liberalize the program of education. The former emphasizes subjects and subject matter, formally presented, whereas the latter recognizes the child and society as central with the materials of learning as means to an end. With the former, the child tends to be regarded as a synthesis of parts and part processes and as a more or less passive recipient of learning. With the latter, the child becomes a dynamic, growing, developing, socialized, goal-seeking organism.

8. All phases of education are influenced in like manner by the prevalence of structural or functional concepts. Curriculum development cannot be understood apart from its relation to the prevailing patterns of thought. Administrative and organizational principles and practices could be shown to have been determined largely by the same concepts. It appears that the statement "As goes analysis, so goes education"—may not be too extreme.

9. It is recommended that more careful attention be given to the frame of reference in which educational investigations are made. Many of the errors of the twentieth century could have been avoided had such insight been available. Education cannot longer claim to be truly scientific if it closes its eyes to implications such as this study has revealed.

Appendix

Abstract of the Original Study

History of the Conflict Between Structural and Funtional Types of Analysis in Educational Research

Analysis forms an integral part of any complete act of thought. Objects and events, the materials of though, must be broken down into smaller units and their interrelationships and their relations to the whole must be studied before thinking can proceed. This is the method of analysis. The process involves more than mere fractionalization. Analysis implies recognition of relationships. The procedure is different and the results are different when elements are studied separately and when they are studied in relation to a meaningful whole. It is this difference which has provided the setting for the conflict in analytic procedure, and it is this conflict which forms the continuity around which this study of the method of analysis has been developed.

The terms "structural" and "functional" do not refer to specific methods of attacking specific problems. They are intepreted as meaning "types" of analytic procedure. They define the frame of reference within which analysis is made. Analyses carried on within the structural frame of reference tend to view objects of study more or less as independent variables, entities, irrespective of their dependent relationships. Analyses carried on within the functional frame tend to view objects of study as dependent variables, wholes, respecting dependent or functional relationships. These two concepts have contended for supremacy throughout history. Education has not escaped. Its methods, its philosophy, its practices have been determined in no small degree by the dominant concept. This study has attempted to trace the development and influence of this conflict in philosophy, physics, biology, psychology, and education, particularly curriculum development.

Research methods are not created; they evolve. They reflect the philosophic attitudes and scientific principles which have been developed in many different fields of knowledge and which experience has been found valuable. Research workers do well to investigate the origin and development of their methods. They may thus escape the incongruities often arising from their use under changed conditions. The method of analysis is no exception. When conditions change the reference frame of analysis should change. It should evolve with the changes in situations requiring analysis. The history of philosophic and scientific thinking indicates that there has been a more or less rhythmic shifting between the structural and the functional concepts in analysis.

The conflict has been evident throughout the history of philosophic thought. Materialism, interspersed with bits of idealism, prevailed in early Greece. Concepts of change and changelessness, Becoming and Being, had brought Heraclitans and Eleatics into conflict. The controversy had been set between the unity of the world order, wholes as primal, and the plurality of things, parts as primal. The fundamental distinction had been made between quantiative and qualitative differences, and the postulate that all qualitative differences can be dealt with quantitatively had been formulated. The basic principles of the whole controversy had been established early and it remained only for the future to refine, reformulate, and revise them. The pattern which predominated in the nineteenth and early twentieth centuries and which influenced the development of modern science and education was the atomistic-mechanism of Galileo and Newton. Physics and biology were influenced in their attitudes toward parts and wholes, hence in their attitudes toward analysis. Classical physics, based on Newton's mechanical principles and emphasizing the particulate nature of matter, detailed analysis, and experimentation with small segments of phenomena, was universally accepted at the close of the nineteenth century. Electro-magnetism and the field theory, the theory of co-ordinate systems, Planck's quantum theory, and Heisenberg's principle of uncertainty challenged its security. The trend in the twentieth century has been away from mechanical concepts of objects existing in space to measures of their functions, away from absolutism to relativity, and away from determinism to indeterminism. Typical nineteenth century biologists employed the mechanical explanation. The various fields of biology, including physiology, dealt with parts in isolation. Thorough-going abstraction, however limiting to understanding, appeared to be essential to comprenhension. This tendency to forget the organism as a whole was challenged by emergent evolution and holistic explanations. More recent data from the fields of physiology and neurology demonstrates the emergent nature of behavior patterns as well as neural structures. Apparently, analysis which fails to consider the whole organism cannot meet the problems of modern biology.

The roots of modern psychology lie in English empirical psychology which tended toward structuralism, and German rational psychology which tended toward functionalism. American psychology fell heir, in its late nineteenth century development, to physiological psychology with its experimental analysis and laboratory procedure. Mental contents were regarded elementally. The genetic method gave rise to analytical and dissective child study. Individual psychology developed in keeping with the trend toward structuralism and detailed analysis. Functional psychology was opposed to structural psychology, the former emphasizing operations and the latter content; the former seeking to discover what the mind does and the latter seeking to discover what the mind is. Gestalt and organismic psychology developed as reactions against structuralism, requiring a different type of analysis, one not neglecting the unity of cerebral process. Spearman recently declared that psychology must not be a one-sided discipline. It needs to be both descriptive, structural, and explanatory, functional.

The history of philosophical and scientific concept development clearly indicates that there has been a conflict between phenomena regarded as originally constituted wholes and phenomena regarded as particulate, assembling themselves by synthetic processes into integrated wholes. The prevailing concept has influenced the method of analysis. Its development has had a cyclical tendency, fluctuating between description and explanation. Knowledge of this tendency and of the nature and implications of the methods involved, should enable educational research workers to evaluate their own analyses more accurately.

The increasing complexity of life during the past seventy-five years has resulted in a concomitant increase in the complexity of educational problems. Educational research replaced non-critical methods of personal judgment with objective, standardized measurements, following the mechanical principles of scientific method. Analysis dealt with events in abstraction under highly controlled conditions. Experimentation isolated the factors to be studied, creating artificial conditions. The gap between research data and actual school and life situations widened. It has become apparent that educational research methods must recognize the interdependence of human relationships and that functional types of analysis must supplement the structural.

Curriculum development has been particularly influenced by current concepts of analysis. The curriculum of fifty years ago reflected the structural concepts prevalent in science and psychology. Content was particulate subject matter; method was disciplinary and formal; organization was logical rather than psychological; administration was authoritarian. There was small regard for child nature and society needs. The complexity of twentieth century educational problems required more critical investigations. An era of rigidly scientific research, counting and tabulating and experimentation under highly controlled conditions, attempted to study the curriculum in the light of the needs of children and society. Such exacting methods frequently overlooked the true nature of children and of democratic society. A countermovement was in progress, claiming to center in the child as a growing, dynamic organism. Its advocates denied the possibility of understanding the child apart from his total being and proposed a curriculum of experience rather than subjects, the methods of which should be real, life activities. It reacted so far as to look with suspicion upon all conventional scientific analysis. The research group, attempting to be functional was limited by structural concepts of method. The "progressive" group's functionalism was frequently superficial by reason of its lack of objective evidence. Both structural and functional concepts appear to be essential to complete research and to adequate curriculum development. At no point has this been forced upon the attention of educators more than in the problem created by the presence of non-academic, non-college-going youth in secondary schools. The last decade of curriculum development has been a period of transition. Static methods based on mechanical principles are being modified to produce more dynamic results that will function in actual life situations. At present,

the emphasis in curriculum development is highly functional. The conclusion drawn from the history of the conflict between structural and functional types of analysis is that educators will accomplish more enduring results through critically objective investigations carried on within a frame of reference which does not lose sight of the whole and the interdependence of its parts.