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A PROPOSED STRUCTURE OF CONTENT TO FACILITATE MORE EFFECTIVE COGNITIVE LEARNING

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Norman, Oklahoma

1969

A PROPOSED STRUCTURE OF CONTENT TO FACILITATE

MORE EFFECTIVE COGNITIVE LEARNING

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A PROPOSED STRUCTURE OF CONTENT TO FACILITATE MORE EFFECTIVE COGNITIVE LEARNING

CHAPTER I

THE PROBLEM

How people learn is always the concern of educators. That concern has been heightened during recent years because of the "knowledge explosion" resulting in more to be learned. To enable students to learn about all that they may encounter during their lives is an impossibility. Because of the mass of available information, the emphasis in learning can no longer be upon the mastery of facts. Instead, students must be helped to go well beyond the relatively few essential facts that they are capable of acquiring to the fundamental ideas and broad concepts that are applicable in a wide range of circumstances. The development of broad concepts and solidly-based larger ideas requires that teaching-learning situations be both effective and efficient.

According to Bruner, how teaching-learning takes place (a theory of instruction) has four major features.

> First, a theory of instruction should specify the experiences which most effectively implant in the individual a predisposition toward learning--learning in general or a particular type of learning.

> Second, a theory of instruction must specify the ways in which a body of knowledge should be structured so that it can be generated and it is characteristic that the formulation of such structure depends upon the state of advance of a particular field of knowledge . . . Here it suffices to say that since the merit of a structure depends upon its power for simplifying information, for generating new propositions, and for increasing the manipulability of a body of knowledge, structure must always be related to the status and gifts of the learner. Viewed in this way, the optimal structure of a body of knowledge is not absolute but relative.
>
> Third, a theory of instruction should specify the most effective sequences in which to present the materials to be learned.
>
> Finally, a theory of instruction should specify the nature and pacing of rewards and punishments in the process of learning and teaching.[1]

It would be beyond the scope of any single doctoral dissertation to pursue in detail all of the four aspects of a theory of instruction. In this study, an attempt was made to explore the structure of a body of knowledge. Although it dealt with only one of the four aspects cited by Bruner, this study may lead to substantive improvement in teaching-learning.

During recent years, Bruner, Woodruff, Gagne, Taba, and others have made significant contributions to the field of learning. Much of their concern has been with the structure of a body of knowledge (subject matter content). They have emphasized the importance of strategies, of coding, of generalizing, and of going beyond any information given to reach the broader aspects of the particular subject content.

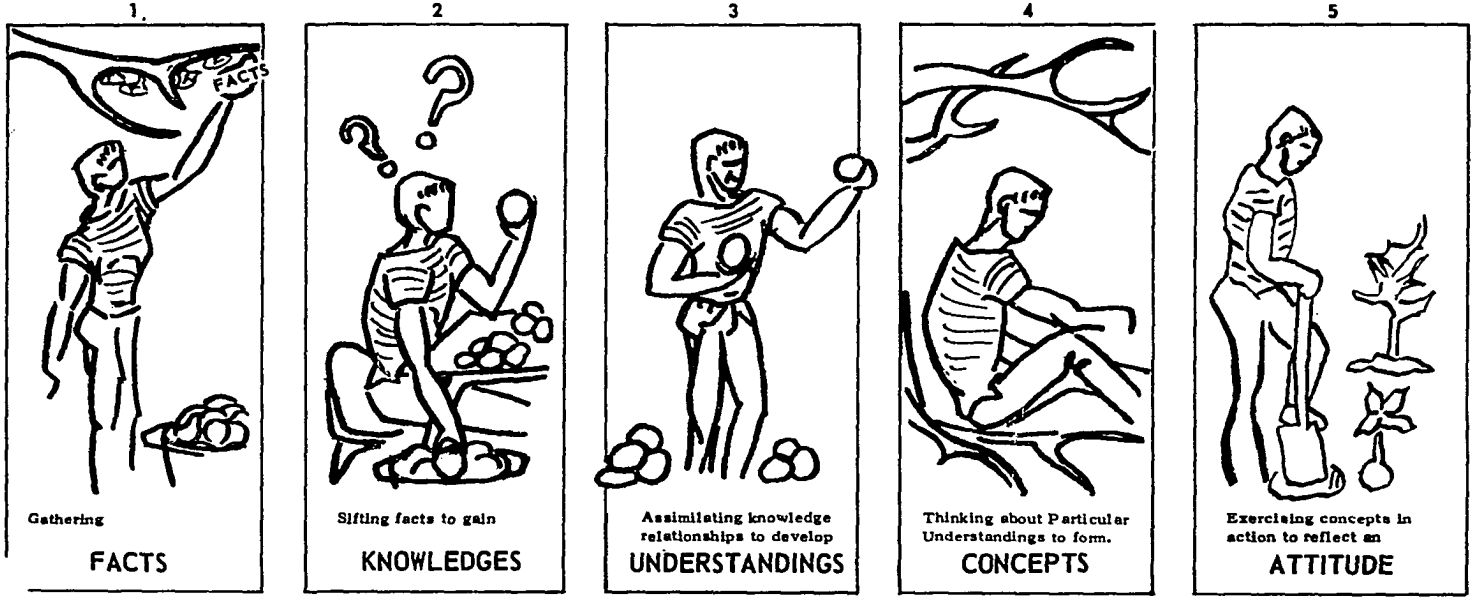
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[1]Jerome S. Bruner, Toward A Theory of Instruction (Cambridge: The Belknap Press of Harvard University Press, 1967), p. 41.

They have not, however, prescribed specific steps or procedural stages which can be applied in structuring a body of knowledge. Porter, in his work in education in family finance at the University of Oklahoma, has for the past eleven years, used with some apparent success a specific process for the structuring of knowledge. Composed of five steps or stages, the process has been used in structuring the content for the subject of "family finance."

Porter's process (see various elements on next page) for the structuring of family finance content involves the fundamental and logical elements in learning. The process which Porter suggests for the structuring of any kind of cognitive content involves: (1) presenting <u>facts</u> in appropriate informational categories, (2) dealing with these facts in ways that reveal relationships which can be built up to <u>knowledges</u>, (3) putting those knowledges to work in problem-solving, decision-making circumstances so that broader <u>understandings</u> are developed, (4) subjecting those understandings to reflective thought so that in-depth mental images or <u>concepts</u> are presented or personally formulated, and (5) providing conditions wherein the concepts are exercised in action that prescribes or reveals <u>attitudes</u> held. While the first three steps above are at times apparent in the structure of content in a textbook or a teacher's lesson plan, the two top steps (4 and 5) can be accomplished only to the extent or degree that the structured content is reinforced by <u>experience</u>.

STEPS IN LEARNING



Key to Steps:

1. Acquiring of facts relative to things done or existing.

2. Sorting and sifting of factual information to gain clear perception and knowledge of the significant facts or truths.

3. Engaging in problem-solving activities wherein specific knowledge is rendered intelligible as relationships are established and understanding is developed through reasoned judgments.

4. Engaging in reflective thinking whereby particular understandings are developed into broad concepts as a result of the generalization process.

5. Utilization of concepts in connection with study of significant problems so that attitudes are formed and reflected in immediate action.

This material, developed by Gerald A. Porter, has been used for approximately 10 years in a series of workshops and other instructional situations at the University of Oklahoma, Norman.

Illustration 1.--Steps in Learning

The five-step process for structuring of content has seemed to be effective in various teaching-learning situations with various kinds of subject matter. This particular process was, in association with Bruner's definition of the function of structure, the basis for the development and identification of the dissertation problem presented herein.

Statement of Problem

The problem of this study was to isolate and to define some of the authoritative bases in the structuring of content that is to be learned, to describe a structure that was developed by means of analytical logic, and to demonstrate the use of that structure with certain content pertinent to life insurance.

Delimitations

This study was delimited to one aspect of the teaching-learning situation--the structure of a body of knowledge. The psychology applicable to structure was the frame of reference. Though an attempt was made to include the ideas expressed by the major proponents of a structural approach to teaching-learning, this study does not include all of the psychology pertaining to structure.

Definition of Terms

The following definitions were taken from Webster's Third New International Dictionary, 1967.

Fact is ". . . a piece of information: A thing done."[1]

Knowledge is ". . . a familiarity or acquaintanceship with something gained through experience or association. Knowledge applies to any body of known facts or to any body of ideas inferred from such facts."[2]

Understanding is ". . . a grasp of the nature, significance, or explanation of something. The ability to understand: The power of comprehending, analyzing, distinguishing and judging. The condition of having attained to full comprehension."[3]

Concept is "Something conceived in the mind: An abstract idea generalized from particular instances."[4]

Attitude is ". . . A position or bearing as indicating action, feeling or mood; behavior representative of conviction or feeling. A persistent disposition to act either positively or negatively toward a person, group, object, situation or value."[5]

The foregoing definitions indicate a hierarchical arrangement of the words fact, knowledge, understanding, concept, and attitude.

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[1] Webster's Third New International Dictionary (Springfield, Massachusetts: G. & C. Merriam Company, 1967), p. 813.

[2] Ibid., p. 1252. [3] Ibid., p. 2490.

[4] Ibid., p. 469. [5] Ibid., p. 141.

Sources of Data

Most authorities agree that teaching-learning involves the three fairly distinct activities of discrimination, abstraction, and generalization. Much of the available learning theory is applicable to one or more of these activities. Sources of data, therefore, included many available books, magazine articles, and pamphlets on learning theory. Particular emphasis was placed upon the use of works of such authorities as Bruner, Woodruff, Gagne, and others who are specifically concerned with the structure of knowledge.

Procedure

The completing of this study involved library research. The first step was an extensive survey of literature bearing both directly and indirectly upon the problem.

The second step was an in-depth study of the psychological and educational processes applicable to the structuring of subject matter content. Because most psychology is not specifically concerned with the structure of a body of knowledge as prescribed by Bruner and other authorities, certain categories had to be defined on which to base the research efforts. The broad categories included discrimination, abstraction, and generalization.

The third step involved the application of psychology and logic to further define, refine, and evaluate the five-step approach set forth by Porter at the University of

Oklahoma. An attempt was made to develop a structure of knowledge that was solidly based in analytical logic and psychology.

The fourth step was to illustrate the use of the established process in developing a structured content pattern for the topic of "life insurance." This activity involved the following steps: (a) isolation of specific categories of life insurance content to be presented, (b) careful examination of that content to gather the appropriate facts, (c) application of the process of generalization, and (d) presentation of the content in an outline of the structured approach.

The fifth step was the preparation of this manuscript report of the study.

Background

Education occupies a prominent position in the American culture. The belief that the educational system is the foundation stone of our well being and the key to our prospects as a people results in education being ranked as one of the nation's vital "industries." Education is devoted to "producing" the trained manpower we need to improve our position in a competitive world.

One of the most profound influences on American education has been the democratic system of government. The belief that the democratic system can operate successfully only if all citizens are educated results in certain unique characteristics of American education. To provide education

for all, America has turned to formal institutions devoted to the educational purpose. People now look to education to solve the many problems facing mankind.

The role of education in continuing our democracy was emphasized by John Dewey in 1940 in a speech on his 80th birthday. He stated:

> The creation of democracy is an issue which is now as urgent as it was one hundred fifty years ago when the most experienced and wisest men of the country gathered to take stock of conditions and to create the political structure of a self-governing society. At the present time, the frontier is moral, not physical. Unused resources are now human rather than material. They are found in the waste of grown men and women who were without the chance to work, and in the young men and young women who find doors closed where there once was opportunity. The crisis that one hundred and fifty years ago called out social and political inventiveness is with us in a form which puts heavier demand on human creativeness.
>
> We have to re-create by deliberate and determined endeavor the kind of democracy which in its origin one hundred and fifty years ago was largely the product of a fortunate combination of men and circumstances . . . Our democracy will not perpetuate itself automatically.[1]

In 1962, Bertrand Russell, another prominent educator said concerning the future, "A great deal depends on education."

Some genuine agonies accompany this appreciation of education. If schools are so important to our survival, many think they should be better than they are. Everyone who talks about education seems to agree that something is wrong with it. But few agree on what the wrong is, and even fewer

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[1]Irvin Edmon, John Dewey (New York: Bobbs-Merrill, 1955), p. 15.

agree on how to set it right. The problems do, however, seem to center around two areas. First, what should be taught? Secondly, how should it be taught? This research study was concerned with the second consideration--"how" subject matter should be taught. More specifically, the problem was how to present subject matter or information so that students might grasp the broad important ideas that deserve attention. Thorough comprehension of these broad ideas enables the students not only to see the subject as a whole but to comprehend how it is applicable in new problem-solving situations, to see relationships, and to think creatively. In other words, what is known becomes useful. The broad ideas become "handles" that may be grasped in dealing with new situations and continued adjustment and modification. Bruner was concerned with this kind of "transfer" when he wrote:

> The first objective of any set of learning, over and beyond the pleasure it may give, is that it should serve us in the future. Learning should not only take us somewhere, it should allow us later to go further more easily.[1]

A main cause of the inadequacy of present education is that learning does not serve the future as much or as well as it should. Students memorize factual material without developing the ability to relate the items of information and to form broader meanings.

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[1] Jerome S. Bruner, The Process of Education (Cambridge: The Belknap Press of Harvard University Press, 1960), p. 17.

Tyler has argued that there are five commonly identified defects in the learning of information:

> The first of these is that students frequently memorize by rote rather than acquiring any real understanding or ability to apply the ideas they remember. For example, John Dewey reports visiting a class in the vicinity of Chicago which was studying the way in which the earth probably was formed. Mr. Dewey asked the students whether, if they were able to dig down to the center of the earth, they would find it hot or cold there. No child could answer. The teacher then said to Mr. Dewey that he had asked the wrong question. She turned to the children and said, "Children, what is the condition at the center of the earth?" The children all replied in chorus, "In a state of igneus fusion." This memorization without understanding is altogether too common an effect of present experiences used to develop information. A second defect in the learning of information is revealed by the fact that many students show a very rapid rate of forgetting.
>
> A third defect is the lack of adequate organization. Many students remember information only as isolated bits and are unable to relate these items in any organized or systematic fashion. A fourth defect is in the degree of vagueness and the large number of inaccuracies in what students recall. The more precise the information is, the less likely students will be to remember it or else they will remember it with a large percentage of inaccuracy.[1]

Humphrey further emphasizes the point with an illustration all too familiar to most:

> . . . True . . . these youngsters know a lot of facts, but they are not educated all the same. Much of what is learned in the ordinary classroom . . . stays in the classroom, until it finally escapes once and for all into an examination paper in another classroom.[2]

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[1] Ralph W. Tyler, Basic Principles of Curriculum and Instruction (Chicago: Syllabus Division of the University of Chicago Press, 1950), p. 47.

[2] George Humphrey, Directed Thinking (New York: Dodd, Mead & Company, 1948), p. 210.

What is needed, then, in education is a greater depth of understanding of the information that is presented. Subjects should not be collections of information to be memorized; but subjects should be organized to make sense out of some portions of the world or of life. How this can be accomplished is the issue at hand.

Thus far teachers have received little help in "how" to impart information effectively. Very little is known about the entire process of teaching and what makes a good teacher. The tendency is to rely on the "naturals" that somehow know how to teach. According to Skinner, ". . . efforts to improve education show an extraordinary neglect of method . . . psychologists have spent half a century measuring the results of teaching while neglecting teaching itself."[1] The attitude is regrettable. Education cannot be improved substantially without examining this basic process.

This study was undertaken with the conviction that good teaching on any level and in any subject-matter area calls for adequate consideration of the structure of that which is to be learned or taught. Structure involves organization of information for clarity and meaning so that students may grasp those ideas that are truly representative of the subject area. Structure provides students with a panoramic view of the subject matter. It introduces the basic elements

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[1]B. F. Skinner, The Technology of Teaching (New York: Appleton-Century Crofts, 1968), p. 119.

that form the subject matter, demonstrates how these elements are related to one another, and shows the student how the specifics fit into the broad view of the subject matter. Through structuring subject content, educators focus upon those fundamental ideas and methods of inquiry from selected fields of study which should be the mainstream of the educational program. Students then develop a core of important ideas and attitudes to which other things may be meaningfully related.

A major objective of this study was to bring a powerful idea in education to the attention of teachers and administrators. It is an idea that can contribute significantly to improvement in the teaching-learning process--the better development of broad ideas through the structuring of information. Structure can be a unique instructional aid which makes a classroom presentation more meaningful, more stimulating, and more effective.

A major purpose of this study was to help teachers increase their awareness of the need for structure and to help them become acquainted with "how" information may be structured. Therefore, a more definitive description of structure with a demonstration of its application is presented in the chapters that follow.

CHAPTER II

THE STRUCTURING OF CONTENT

Although man has been accumulating information for many hundreds of years, interest in the structure of subject content has been significant only during the last decade or so. The beginning point in time is difficult to determine, but certainly Bruner's The Process of Education focused attention on structure as it relates to teaching-learning.

Bruner contends that it is

> . . . the structure of knowledge--its connectedness and its derivations that make one idea follow another . . . it is structure, the great conceptual inventions that bring order to the congeries of disconnected observations, that give meaning to what we may learn and make possible the opening up of new realms of experience.[1]

Bruner believes that good teaching should include emphasis upon the structure of content of a subject and that structure is important at all grade levels. Bruner argues that all students can be introduced to the

> . . . great and simple structuring ideas of any discipline--ideas to which they will return in a progressively sophisticated context throughout a "spiral curriculum".[2]

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[1]Jerome S. Bruner, On Knowing (Cambridge, Massachusetts: Harvard University Press, 1962), p. 120.

[2]Bruner, The Process of Education, p. 52.

Although much has been written about structure in the professional literature during the past ten years, there seems to be much confusion as to what structure actually means.

Definition of Structure

Most educators tend to define structure as the broad ideas that "represent" the subject area and the goal of instruction. The National Committee of the NEA Project on Instruction defined structure as the ". . . body of concepts that limit the subject matter and control research about it."[1] In developing a theory of instruction, Bruner observed that ". . . for any body of knowledge there is a minimal set of propositions, or statements, or images from which one can best generate the rest of what exists within that field."[2] Phenix further supports the idea of providing a framework for dealing with information when he suggests that ". . . content should be selected so as to exemplify the 'representative ideas' of the various disciplines."[3]

In defining structure, Schwab speaks of the "fundamental ideas of a discipline," the great underlying principles that give a coherence, a logic, a pattern, to the

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[1] National Committee of the NEA Project in Instruction, Education in a Changing Society (Washington, D. C.: National Education Association, 1963), 166 pp.

[2] Jerome S. Bruner, "Needed: A Theory of Instruction," Educational Leadership (May, 1963), p. 525.

[3] Philip H. Phenix, Realms of Meaning (New York: McGraw-Hill Book Company, 1964), pp. 322-323.

various bits or pieces of data for a particular field of study. To put it another way, structure dictates the mental set typical of a specialist in the subject.[1]

Structure, in this research study, refers to the process of arranging information in a hierarchy involving facts, knowledges, understandings, concepts and attitudes. The process of structuring information results in a composite design or model indicating the interrelation of ideas. To help students recognize the relationships among ideas and to formulate the broad concepts in a subject area are the main purposes of structuring information. The structural design facilitates the flow of ideas required in the formulation of broad concepts. Although there are alternate ways of formulating concepts, the design provides a main flow through which the information may be processed. Three main functions of the process of structuring information are as follows:

1. To schedule the processing of information in a continuous and sequential flow with each idea building upon a previous one to focus upon the broad ideas.
2. To provide direction for guidance of the flow of information.
3. To simplify storage and retrieval of information.
4. To encourage methods of thinking.

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[1]Jack R. Cameron, "Speculations on the Conceptual Structure of English," English Journal (March, 1967), p. 379.

Most descriptions of structure have been concerned with a focus on the broad ideas or concepts. Little attention has been given to "how" to structure content to focus on the broad ideas. But, structure should give emphasis to the broad ideas that are brought into focus through organization of subject content. To most people, structure implies a static and unchanging sequential ladder of progression from simple to complex. In this context, disciplines may be said to contain pre-existing structures waiting only to be discovered.

Emphasis upon structure, therefore, has most often contributed to sequential placement of subject content. Although content sequence has provided some guidance, criteria of complexity are often difficult to determine and elusive or incomplete when found at all. The static structure based on a given system of prerequisites can be appropriate in the natural sciences such as mathematics. The social sciences, however, cannot be made rigorously sequential the way mathematics can. A given system of prerequisites, in literature, for example, is difficult to defend.

What is needed is a process for structuring subject content that will be applicable to both the natural sciences and the social sciences alike. Such a process is set forth in this research report.

Process for Structuring

This study was based upon the assumption that emphasis on the broad ideas and concepts is proper in education, and that the emphasis can best be achieved through structuring the content. The five-step structure in this study differs from most other "structures" in that it is a process rather than a given system of prerequisites resulting in a static and unchanging structure.

This study is not in agreement with the idea that pre-existing structure in a subject area is waiting to be discovered, and that each subject can be structured in only one way. Each discipline can be examined and structured in terms of several patterns of conceptual ideas. Various individuals utilizing the same process in the same subject area might produce significantly different structures. The broad ideas used here were first emphasized by Bruner in his Theory of Instruction, and those broad ideas are further developed through thought processes. Miel contrasted knowledge of structure with the dynamics of a field; where the former is conceived of as a set of interrelated principles, however abstract and static in terms of a learner, the latter constitutes the means of continuing inquiry.[1] The structural

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[1]Alice Miel, "Knowledge and the Curriculum," New Insights and the Curriculum, edited by Alexander Frazier (Washington, D. C.: Association for Supervision and Curriculum Development, a department of the National Education Association, 1963), p. 75.

process presented here is designed to be dynamic and to provide for continuing inquiry.

The process for structuring information developed in this study can help to overcome the difficulties in structuring that are due to a lack of logical progression in content. It is not, for example, essential for a high school student to have had a course in general insurance in order to study life insurance. The process for structuring presented here is applicable in cognitive learning regardless of level, subject area, or specific type of curriculum.

The process for structuring is fundamental to all cognitive subject content. An attempt was made to make this structural process reflect closely the logical and natural development of the thought processes.

The challenge for teachers in structuring information is to provide guidance from which abstracting, generalizing, and the higher, more productive thinking will develop. The process is one of supporting conceptual learning; of engaging students in inquiries into the relationships of ideas to discover the broad conceptual patterns. Subject content is discovered to be not final and fixed, but the product of continuing inquiry, open to re-examination, renewal, and change.

The process presented here does allow the teachers to guide students in formulating concepts and in the use of advanced methods of thinking as the process centers on two aspects. The process centers on sequencing the substantive

content to be taught to focus on the broad concepts of the subject matter. And partly, activity focuses on methods of thought--the critical and reflective thinking by which students explore the content and apply their comprehension to an analysis of the problems of our time. According to Bruner, a curriculum reflects not only the nature of knowledge itself, but also the nature of the knower and the process of acquiring knowledge.[1] The process presented here centers on both subject matter and method, and the line between the two grows necessarily indistinct as the process is applied. A relationship between emphasis in content and teaching method is explored to extend learning to the development of concepts and the higher level inquiry skills.

The process identifies the elements of the structure, indicates their relationship to each other, and reveals the principles of organization and the requirements of organization for the conditions under which it is to operate. The composite structural design may be analagous to a system of lighthouses at sea. The structure does not indicate a static result but does guide movement--in this instance, toward the formulation of broad concepts and fundamental ideas.

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[1]Jerome S. Bruner, "Some Theorems on Instruction Illustrated with Reference to Mathematics," Theories of Learning and Instruction, edited by Ernest R. Hilgard, Sixty-Third Yearbook, Part I, National Society for the Study of Education (Chicago: University of Chicago Press, 1964), pp. 306-335.

The remainder of this chapter describes and develops the process for structuring information which may have broader implications than the fixed sequential approach to cognitive comprehension. The process described here is representative of the thinking about structure that must be done if we are to achieve Bruner's ideal of powerful, simple structuring of ideas.

Techniques for Structuring

A five-step process (facts, knowledges, understandings, concepts, and attitudes) for structuring subject content is the focus of this dissertation. Development of the five steps involves the techniques of discrimination, abstraction, and generalization. The techniques are described in the following paragraphs. They are mentioned, but not discussed again in detail, in the following chapter where the five-step structure is considered. The techniques are vital to the process of developing the five-step structure.

Discrimination

Discrimination is the technique by which students differentiate or separate one thing from another. To discriminate is to note differences. By discerning differences, even though sometimes minute, students distinguish what is relevant from what is irrelevant; what is alike from that which is different.

> A "discriminating" person can tell the difference between colors, shapes, and sizes of objects; he can identify three dimensional forms from different aspects; he can find patterns concealed in other patterns; he can identify pitches, intervals, and musical themes and distinguish between various tempos and rhythms--all of this in an almost infinite variety.[1]

Discrimination, a valuable mental operation, involves both excluding and receiving impressions.

> A person is intelligent to the degree that he actively discriminates in his environment of stimuli . . . we may forget that the key to felicity and wisdom lies as much or more in our power of excluding as in receiving impressions. Our humanness rests upon a wise asceticism, not upon indiscriminate hospitality to every message impinging upon us from the world . . .[2]

If human beings did not have the power to both include and exclude stimuli, they would be lost in the constantly impinging forces in the environment. Discrimination enables one to choose the stimuli to which he will react; thereby largely determining his own direction and experiences.

An important aspect of discrimination in this study is the ability to differentiate between relevant and irrelevant information and to further recognize likenesses and variations in ideas in all attempts to classify and categorize. A student must first sift through information on a particular topic to determine which ideas are relevant and important. According to Bruner and others, "One of the most characteristic

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[1] Skinner, op. cit., p. 73.

[2] Phenix, op. cit., p. 375.

features of seeking information is that we must sift alternatives in order to decide what is relevant."[1] The correctness of the discrimination of the facts will determine the accuracy and relevance of the ideas later developed from the factual information.

To discriminate requires ability to recognize the respect in which two or more ideas are similar. Because ideas, unlike objects, have no visual differences, they must be categorized according to their mental relationship. Facts may be discriminated in various ways and the discriminations are constantly subject to change. By way of illustration, the fact that ordinary life insurance is purchased by individuals usually in amounts of $1,000 or more may be differentiated from other facts concerning forms of insurance, policy benefits, or purchase plans. Discrimination becomes important as it enables students to organize bodies of content. With adequate organization, information is made manageable and forced into patterns for future use.

Abstraction

Abstraction, the second essential technique in the process of structuring content, involves ". . . the selection of a common feature, characteristic or property that is present in a number of stimuli which differ in other

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[1]Frederic A. Mosher and Joan Rigney Hornsby, "On Asking Questions," in Studies in Cognitive Growth, edited by Jerome S. Bruner, Rose Olver and Patricia Greenfield (New York: John Wiley and Sons, Inc., 1966), p. 86.

characteristics."[1] Abstraction occurs when the individual classifies or categorizes objects, events, or experiences and thus gives meaning to them. For example, an individual engages in abstraction when he recognizes a document to be an insurance policy. Through past experience, the individual has learned to recognize the defining attributes of insurance documents. Exercising the abstraction technique, the individual concludes that the object, being like the others in certain respects, is an insurance document. Knowing that insurance documents differ, he goes one step further in abstraction and picks out the characteristics of the particular document so as to identify it as a life insurance or income protection policy.

The basic idea in abstraction is separation, distinction, or selection of a certain aspect of a thing apart from the whole. The mental ability to abstract requires the comprehension of similarities to compare and to classify. Abstraction occurs as an individual searches for meaning among ideas, objects, or experiences in successive experiences with them. Abstraction may be only a by-product of rote learning but it is a necessity in the higher levels of learning and thinking.

It is by means of abstraction that categorization is accomplished. The abstraction of common elements provides

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[1]Norman L. Munn, L. Dodge Fernald, Jr., and Peter S. Fernald, Introduction to Psychology (New York: Houghton Mifflin Company, 1969), p. 307.

the means by which ideas possessing qualities or characteristics can be grouped together or categorized. Through categorization, information is grouped into logical patterns on the basis of a distinguishing feature or features. Individuals find it difficult to deal adequately and effectively with the countless isolated facts with which they are confronted; systematically sorting things into categories, therefore, helps to reduce the complexity of our environment. According to Bruner, organization is important because the human mind is limited in the number of independent bits of information with which it can deal at any one time.

> The principal problem of human memory is not storage, but retrieval . . . The key to retrieval is organization, or in even simpler terms, knowing where to find information and how to get there . . . One can cite a myriad of findings to indicate that any organization or information that reduces the aggregate complexity of material by imbedding it into a cognitive structure a person has constructed will make the material more accessible for retrieval. In short, we may say that the process of memory looked at from the retrieval side, is also a process of problem solving: how can material be "placed" in memory so that it can be got on demand?[1]

Through categorizing, isolated bits of information may be reduced to logical patterns of organization so that memory storage and retrieval are facilitated. By placing details in a cognitive structure or generic organization, both the details and the broad ideas can be recalled more effectively.

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[1]Jerome S. Bruner, "The Act of Discovery," in Readings in the Psychology of Cognition, edited by Richard C. Anderson and David P. Ausubel (New York: Holt, Rinehart and Winston, Inc., 1965), pp. 619-620.

Facts must be categorized on the basis of certain distinguishing elements to bring order and meaning to them. Facts are not valuable in isolation. They should be fitted into patterns that make them more meaningful and easier to remember; they then become more useful as they are manipulated and used in new situations. Once the pattern or mosaic is formed through the categorizing and the structuring of content, additional information can be placed in the existing pattern. In this way, the learning of new information constantly builds on what was learned previously.

Once information is categorized, the ideas may then be examined for their relationships to each other to determine their composite meaning. Verbal mediation and the power to synthesize relationships must be exercised. The relationships in ideas are usually determined by their functions. Recognizing a particular relationship involves separating out and comparing certain elements and then examining and thinking about them to determine their deeper meaning. Both comparison and contrast are very useful methods of showing relationships. The student thinks "this is similar to, different from, a part of, the cause of" the other idea or data. Thinking reveals to the student the more complete nature of the thing being observed. Meaning arises as a result of cognizance of the relationship or group of relationships. The search for relationships, sometimes called "cumulative constructionism" is necessary for problem solving. Although the students must

search out the relationships for themselves, the teacher may serve as a guide in the activity, allowing adequate time for thought and emphasizing elements that should be considered.

Generalization

Following the use of the techniques of discrimination and abstraction in establishing the relationships between elements of content, the technique of generalization may be applied to develop the fullest kind of comprehension. Generalization, the key to effective learning, must be preceded by discrimination and abstraction. Generalization is the technique whereby a broad idea may be "discovered" in the observation of likenesses common to a number of individual cases. "Discovery" in this instance is not dependent on new information but involves rearranging information to gain new insights. The generalization technique may be associated with observation, analysis, and the comparison of details. By generalizing one may draw conclusions from a group of events to further organize and give meaning to specific content. The conclusion or general statement serves to summarize a number of specific items and can become a qualitative aspect in itself once it is separated from the specific items underlying it. Thus the general statement is in some respects "taken away" from the specifics and handled as a "real" in itself. The general statement now exists as an independent quality and can be applied to any new situation as appropriate. To

comprehend the general statement, therefore, is to comprehend the sizeable amount of information behind it.

For the purposes of generalizing, a student must have ideas that are in one or more respects similar; he must recognize the constellation of "respects" in which they are similar, and verbalize or mentally comprehend the general idea that underlies their similarity. Woodruff describes generalization as ". . . picking out of a large number of experiences the significant common meanings that persist and seem not to be changed by additional experience."[1] The precise point at which additional experience will not affect the generalization technique is difficult to know. However, sufficient concrete examples must be encountered to avoid a false interpretation. Generalizing, based on limited specifics, is detrimental to the learning process. It may produce incomplete or inaccurate knowledges, understandings, and concepts.

The importance of the generalization technique and its power to predict and order our world is overwhelming. Formulating the general statement and comprehending its conclusive nature of specific elements enables one to reduce the number of isolated bits of information he must remember, permits him to systematically organize ideas, and gives him predictive abilities in new situations. It is through generalization that an individual can learn the broader meaning of his

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[1]Asahel D. Woodruff, Psychology of Teaching (New York: Longmans, Green Company, 1952), p. 315.

experiences. The importance of generalizing from categories of information or from a complete generic coding system is emphasized by Bruner.

> We propose that when one goes beyond the information given, one does so by virtue of being able to place the present given in a more generic coding system and that one essentially "reads off" from the coding system additional information either on the basis of learned contingent probabilities or learned principles of relating material.[1]

Generalization tends to enhance or extend the meaning in available information and it also better enables one to transfer what he learns to new problem solving situations.

To Woodruff, the secret of transfer seems to lie in the technique of generalization.

> . . . learning will involve identifying on the one hand the generalized aspects of what is being studied, and on the other hand a generalized description of the kind of situations in which that generalized knowledge properly fits, and then tying those two or more generalized items together by associational learning. For example:
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> (1) Reduce the method of driving a jeep to a series of general steps that are typical of all cars.
> (2) Put before the learner the fact that all cars are operated by those generalized steps with slight variations in the manner of carrying them out.
> (3) When the steps are learned, see that the learner associates together the two ideas: (a) the steps, and (b) the idea that other cars are driven by those steps.
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> He can then have an experience in applying his generalized knowledge to one or two new situations.[2]

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[1]Jerome S. Bruner, "Going Beyond the Information Given," Contemporary Approaches to Cognition--A Symposium (Cambridge: Harvard University Press, 1957), p. 49.

[2]Woodruff, Psychology of Teaching, p. 323.

Teachers can aid in helping students comprehend the broader meanings of their experiences through providing situations where generalization is encouraged.

Whether or not generalization occurs depends on the extent to which the student is aware of the meaning of his ongoing experience, and the extent to which he is seeking to generalize and find deeper meaning. The technique is materially helped when teachers direct the attention of their students to the significance of experience. According to Bernard, "Generalization occurs to some extent with every reinforcement."[1] It is important, therefore, that the teacher be active in the structural process to provide reinforcement whenever possible. Humphrey argues that the ability to generalize increases as intelligence increases.[2] It is Woodruff who indicates that generalization can be further developed among most students by mental review and thinking.[3] Most individuals have the ability to reason and generalize. What is important is that their generalizing be based on sufficient and relevant information and that enough time be allowed for mental review and thinking so that the composite statement or interpretation obtained through generalization is accurate.

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[1]Harold W. Bernard, Psychology of Learning and Teaching (New York: McGraw-Hill Book Company, 1965), p. 409.

[2]Humphrey, op. cit., p. 209.

[3]Woodruff, Concepts of Teaching, p. 177.

Classroom utilization of the technique just described is not easy. Taba has indicated some of the problems involved.

> The teacher is required to make quick and subtle judgements about the cognitive processes of her pupils, about when the discussion has gotten to the point that an attempt at generalization is called for. But that is not the teacher's only burden; she also has the problem of individual differences. Some pupils need more concrete instances than do others before they are ready for the leap to more formal or abstract thinking.[1]

To determine the proper number of specific instances from which students can accurately generalize is difficult. Bruner points up another problem, an attitude problem.

> How do you arrange learning in such a way that the child recognizes that when he has information he can go beyond it, that there is connectedness between the facts he has learned with other data and situations.[2]

The teacher should provide guidance and encouragement to the student in the structural process of developing the broad idea while also helping the student to avoid some of the pitfalls that can occur from premature symbolization.

To summarize, the techniques of discrimination, abstraction, and generalization are used in the process of structuring subject content. However, each technique may be used to a different degree in each of the levels in the

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[1]Morey R. Fields, Frontiers in Education (New York: The Center for Applied Research in Education, 1967), p. 40.

[2]Robert Glaser, "Variables in Discovery Learning," Learning by Discovery: A Critical Appraisal, edited by Lee S. Shulman and Evan R. Keislar (Chicago: Rand McNally Company, 1966), p. 103.

structural process. Discrimination occurs at every level, but is especially important at the factual level. Abstraction may be incidental to rote learning at the factual level and even in seeking to gain knowledges. Abstraction becomes fundamental and vital to the development of understandings, the formulation of concepts, and the definition of attitudes. Generalization, also, is fundamental to the three higher levels of learning. Thinking, the mental activity by which experiences are differentiated, abstracted, and generalized permeates the entire process for structuring subject content.

The Basis of Structure

The development of understandings and the formulation of concepts are complex kinds of learning experiences. In both instances, information must be accumulated according to the higher-order principle, wherein broad ideas are formed by putting together two or more simpler ideas at rising levels of complexity. The higher-order principle is also operative in moving from the memorizing of facts to the gaining of knowledges. For example, an individual has already learned the elementary ideas that ordinary life insurance is purchased by individuals usually in amounts of $1,000 or more, that industrial life insurance is made available to workers through their employers, and that group life insurance is purchased under one master policy by a group of persons. By adding these factual items together he reaches the second step,

knowledge, which may be expressed as life insurance is made available to individuals in various forms.

The example demonstrates the higher-order principle involved in the process of structuring content. The higher-order principle has been investigated by Bloom, Woodruff, Taba, Phenix and others. Although the "types of learning" described by each carry different labels, they are all concerned with the idea that learning can be classified in terms of its relative general complexity.

Bloom speaks of learning in certain general hierarchies of responses, or behaviors. His classifications for dealing with information were intended to provide a framework for classifying learning in terms of its relative general complexity.[1]

Woodruff refers to ideas built up in hierarchies, from simple bits of information, from small concepts to larger concepts, and finally to generalizations and abstractions. All the way up through the structure, each idea is made up of smaller ideas which are combined in terms of some common qualities. One cannot formulate the larger ideas until he has the smaller ideas. Thinking is the process of reviewing the smaller ideas and discovering the larger ideas which can be made from them.[2] Taba suggests designing the

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[1]Benjamin S. Bloom, Editor, Taxonomy of Educational Objectives (New York: David McKay Company, Inc., 1965), 207 pp.

[2]Asahel D. Woodruff, Basic Concepts of Teaching (San Francisco: Chandler Publishing Company, 1962), 300 pp.

total curriculum so as to move from simple to complex illustrations of fundamental concepts or representative ideas, from lesser to greater precision of analysis in the intellectual processes involved, and from limited to broad application of concepts.[1]

Phenix emphasizes that ". . . the ideas comprising a discipline may be arranged in a hierarchical order." At the top belong those few concepts that characterize the discipline in all its parts. Next come certain corollary ideas suggested by the primary ones. On the next lower level appear certain important concepts that serve as organizing principles for large subdivisions of the discipline, and below these are ranked many more particular ideas that prove useful in the detailed development of the various special problems and the area of the subject.[2]

This brief background provides a context or a foundation for the five-step analytical process for structuring content. The five steps include acquisition of facts, knowledges, understandings, concepts, and attitudes. The structure, when fully developed, represents a hierarchy of ideas. The structure focuses attention on the substance of the content with emphasis upon the broad ideas or concepts. The structure

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[1]Hilda Taba, Curriculum Development, Theory and Practice (New York: Harcourt, Brace, and World, 1962), 526 pp.

[2]Phenix, Realms of Meaning, 319 pp.

demonstrates the implications of logical, sequential learning. A description of the five-step structural process constitutes Chapter III.

Specific Suggestions for Structuring

Although much has been written concerning the structure of content, little has been written specifically concerning "how" to structure content. The emphasis in this research study is upon "how" or the process of structuring content. Bruner, a major proponent of structure, offers no prescription for structuring. He does, however, offer suggestions for structuring content.

Bruner's Theory for Structuring

Bruner's interest and belief in the importance of structure is apparent when he argues that teachers should ". . . present subject matter effectively--that is with due regard not only for coverage but also for structure."[1] The emphasis upon structuring content to ". . . give a student as quickly as possible a sense of the fundamental ideas of a discipline . . ." is a recurrent theme in Bruner's writings.

Although he discusses structure at length, Bruner does not give a prescription for the structuring of subject content. He believes that ". . . much too little is known about how to teach fundamental structure effectively or how

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[1]Bruner, The Process of Education, p. 2.

to provide conditions that foster it."[1] Bruner does, however, offer a theory concerning an effective structure of subject content. His opinion is as follows. The optimal structuring of information contains the following underlying propositions: economy, productiveness, and power, all relative to the learner. First, the structure should simplify the diversity of information within the field through the use of broad concepts and ideas. Secondly, the structure should enable one to generate new propositions, to go beyond the information given, and finally the structure should "increase the manipulability of knowledge."[2] "Manipulability" refers to the ability to manage information; to deal with it in new situations.

> . . . when you put something into words it now becomes possible for you to take that thing . . . and . . . subject it to the combinings and re-combinings that are made possible by the transformative powers of language.[3]

Bruner continues with specific suggestions concerning the structure of information:

> . . . The idea of one right sequence is a myth. There is . . . a sequence that is particularly interesting in that it seems to increase the likelihood that knowledge will be converted into a structure that is economical, productive, powerful, and therefore transferable. It is worth pausing over. The first thing that you might do is to try leading the child to

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[1] Ibid., p. 12.

[2] Bruner, "Needed: A Theory of Instruction," Educational Leadership, p. 525.

[3] Ibid.

> to grasp a structure by induction from particular instances. You would give him lots of particular instances and let him recognize their underlying regularity. If you want the child to transfer his learning to new situations give him practice while he is learning.
> . . . The second thing you might try is the use of contrast in your sequence. Economy of representation often makes it necessary for the child to see the contrasting case.
> . . . Third, avoid premature symbolization. And fourth, you might try to give the child practice at both leaping and plodding. Let him go by small steps. Then let him take great leaps, huge guesses. Without guessing he is deprived of his rights as a mind. We cannot get all of the evidence. It is often by guessing that we become aware of what we know.
> . . . Another question related to sequence has to do with what I would call "revisiting." Rarely is everything learned about anything in one encounter. Yet we seem to be so impelled to cover, to go through the Elizabethan Period, and on through such and such period that we forget the obvious point--that the pot is rarely licked clean in one swipe. Perhaps we would do well to take music listening as a model. It is not simply a matter of mastering this subject, or even of converting it into more powerful form. Rather, revisit means an opportunity of connecting what we have learned now with what else we know. Why is such an obvious point so often ignored?[1]

Although no formula for structuring has been presented before, the purpose of this study was to offer some aid in "how" to structure content for effective presentation. The structure in this study refers to the composition of facts, knowledges, understandings, concepts, and attitudes of a subject--the way in which they are interrelated and their vertical and horizontal arrangement.

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[1] Ibid., p. 530.

Practical Application to Demonstrate Bruner's Theory

The structural process presented in this study has been used with apparent success by Porter at the University of Oklahoma for approximately ten years. Comparison of the five-step structural process with Bruner's theory for structuring content reveals a close similarity between the two. The five-step structural process represents a practical application of Bruner's theory.

First, the information is structured inductively. Once the composite structural design is developed, the teacher may proceed inductively or deductively. However, the structure itself is developed inductively.

> Finding the structure in a body of subject-matter instances is an example of induction, and the structure eventually discovered is a general proposition characterizing or summarizing the properties of these instances.
> . . . The general statement is often the first one given in teaching (deductive) because it is easiest to remember and because defining and presenting an adequate sample of instances is a difficult task.[1]

The advantage of the inductive approach, however, is emphasized as follows:

> . . . great teachers and great writers know the principles of inductive teaching intuitively. Their writings provide us with demonstrations of the effectiveness of giving examples before rules.[2]

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[1] Glaser, op. cit., p. 15.

[2] Ibid.

Utilizing the process for structuring content by given specific instances, which then permit the learner to generalize to the broad ideas, can be an effective approach to teaching-learning.

Secondly, premature symbolization may be avoided through a careful sequence of relatively small steps with reinforcement at each level. The student does take relatively small steps from the factual level to the knowledge level. Then, larger steps or "leaps" may be taken to the development of understandings and the formulation of concepts where more discovery is applicable and guesses made possible. The students have a systematic encounter with the basic ideas--proceeding from the most simple and concrete to the most complex and abstract; each approached from the foundation of the last. The structural process may be compared to the computer simulation of information processing in which elementary information processes combine into compound processes.

Third, the structural process provides for the "revisiting" of the subject content as the same information is reexamined-- each time in more depth--resulting in a spiraling effect. In addition, the principle of reinforcement may be a significant contributing factor to the success of the process.

> Reinforcement occurs in several forms--prompt knowledge of results, the presentation of either

> corrective or new material, and the challenge of progressively more challenging material.[1]

Numerous opportunities are available for reinforcement as the student progresses from one level to the next. The perceptive teacher will be aware of and utilize the opportunities. Ample opportunity for thought should be provided.

The structure is similar to the principles of programming in that it leads the student step by step, each step within his range, and the student usually comprehends each step before moving on to the next. The structure ". . . gives the student extensive practice on a series of related problems and carefully leads the student toward the formulation of concepts."[2] Hopefully, the formation of concepts through this gradual process with adequate time to see relationships will prohibit the formulation of concepts from specifics that are too limited.

Summary

This study was based on the assumption that the focus on broad concepts and fundamental ideas is the proper emphasis in education. One way of helping students formulate broad concepts is through the structuring of content. The structure of content, one phase of the teaching-learning situation, is the focus of this study.

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[1] Bernard, op. cit., p. 414.

[2] Henry Ellis, The Transfer of Training (New York: The Macmillan Company, 1965), p. 34.

The structure of content usually refers to a sequential placement based upon a given system of prerequisites. However, structure in this study refers to a process of structuring content. The process of structuring content cannot replace the sequential placement. It can, however, be utilized in addition to sequential placement. The process is especially effective in cognitive areas such as life insurance which, unlike the natural sciences, does not lend itself well to a sequential structure.

Development of the process requires utilization of the techniques of discrimination, abstraction, and generalization. Discrimination is the technique by which individuals differentiate or separate one thing from another and distinguish what is alike from that which is different. Abstraction is the technique by which certain common characteristics are drawn from ideas. Through generalizing an individual combines the certain shared characteristics into broad ideas or concepts.

The process for structuring content is based upon the idea that information can be classified in terms of its relative complexity which takes the form of a higher-order principle. The higher order principle is formed through putting together two or more simpler ideas.

Although much has been written concerning the structure of content, little has been written concerning "how" to structure content. The major purpose of this research study

was to establish a way of structuring content to focus upon the broad concepts and fundamental ideas.

CHAPTER III

STEPS IN STRUCTURING CONTENT

The five-step process for structuring content presented in detail in this chapter was developed to help individuals go beyond the acquisition of factual information in the teaching-learning situation to the formation of the more fundamental ideas and broad concepts. Through the process of structuring subject content, individuals can see the interrelation and interdependence of ideas and how they fit into a broader pattern of meaning. The structure in this instance was developed by means of analytical logic. It involves careful examination of the content to isolate the appropriate facts. It permits the application of the technique of generalization and it utilizes the thought processes in moving upward from the base of factual information to the formulation of broad concepts and attitudes.

The theoretical model of what Porter[1] calls "steps in learning," arranged in a hierarchy of complexity, is potentially very useful as a framework for thinking about a subject in terms of the forming of concepts. Based on Porter's

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[1]See Chapter I.

experiences in family finance education and other areas of education, the hierarchy identifies the formulation of concepts as the most sophisticated type of learning, the development of understandings as the next most sophisticated, the gaining of knowledges the next, and so on down through the acquisition of factual information. Each kind of learning is dependent on the kind below it in the hierarchy. The five-step process for structuring content is described in the following sections. The topic "life insurance" is used to illustrate the process.

Acquiring Facts

In learning any subject, a foundation must be laid through many concrete experiences with facts. A fact is "A piece of information: A thing done."[1] Here, by way of illustration, are some life insurance facts:

1. Ordinary life insurance is purchased by individuals usually in amounts of $1,000 or more.
2. Death rates for various age groups are determined from a mortality table.
3. Insurance companies provide physical examinations to approximately 4 million prospective policyholders each year.
4. The person named to receive proceeds of a life insurance policy is the beneficiary.

The importance of facts should be emphasized. The basic facts in any subject serve as tools for thinking; one must have

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[1] Webster's Third New International Dictionary, 1967, p. 813.

facts before one can generalize or think. The facts, therefore, should be the starting point for a chain of inductive inferences. Of course, not just any fact will serve the purpose. The relevant facts must be ferreted out to tell the significant story of the subject at hand.

> The number of facts selected for instruction should be fewer and of sufficient importance and frequence of use that it will be possible for the students to acquire this information with accuracy and precision. . . . Select only important information to include as worthy of remembering.[1]

"Reasoning must depend upon facts; the more pertinent the facts, the more direct and incisive the reasoning."[2] Pupils must not only be able to learn (memorize) the facts given them, but should be able to search for the relevant facts, evaluate them, and use them properly.

Often in seeking to develop the broad ideas, teachers become apologetic about the importance of having students acquire a firm command of rudimentary facts and skills. Educators have tended to forget that ". . . ideas grow best in minds well nourished with organized facts."[3] When the teachers conclude that certain mechanical skills and rote memory of facts are basic to the structure of what they want to

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[1]Tyler, op. cit., p. 47.

[2]Bernard, op. cit., p. 80.

[3]Bernard Z. Friedlander, "Today's Innovations in Teaching," NEA Journal (March, 1966), p. 11.

teach, they should find ways to teach them effectively and without apology.

Business teachers, for example, should not fear having students recognize and remember facts about insurance. How can they tell whether a student has any worthwhile comprehension of insurance if he cannot recall the facts cited above.

> . . . we ought to have serious reservations about a student's grasp of a concept unless he can exemplify it with a factual recitation or able demonstration.[1]

Facts get their meaning and value from use. Although one must have facts before one can generalize or think, it is not necessary to pile up a great deal of information before thinking begins.

> Prolonged assimilation of facts without a corresponding reshaping of the conceptual schemes with which to organize them is bound to retard the maturation of thought. On the other hand, a premature leap into a more complex or a higher level of thought is likely to immobilize mental activity and cause reversion to . . . a lower level of thought . . . An appropriate transition from one (level of thought) to the other demands a proper match between the current level and that which is required. Determining the proper match is one of the most difficult tasks in teaching . . .[2]

Although the importance of facts has been emphasized, learning facts just to know factual information is futile. Facts are subject to a high rate of obsolescence; the facts of today rapidly become the fiction of tomorrow. Because most learning

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[1] Ibid., p. 12.

[2] Hilda Taba, "Teaching Strategies and Thought Processes," Teachers College Record, LXV (1964), pp. 524-534.

does involve the acquisition of facts, teachers would do well to remember that ". . . concepts are not formed in the absence of facts; however, facts can be memorized and recalled without associating meaning with them."[1]

The rapidly changing nature of factual information through constant new discoveries requires that teachers help students go beyond the factual information to develop the broader ideas or concepts. Knowledges, understandings, and concepts grow out of a wealth of factual information. In the end, much of the factual material is forgotten or cannot be easily remembered and yet the broader ideas are retained.

The broad ideas, however, cannot be acquired meaningfully without utilizing details at the time. "Actually, if facts are organized into meaningful relations and generalized, the details themselves are likely to be better remembered than if they were acquired in discrete fashion."[2]

If facts are so important, what is the ideal way to enable students to acquire them? The following five principles,[3] developed by Klausmeier facilitate the learning of facts. Though the teacher is the implied doer, all except

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[1]Herbert J. Klausmeier, Learning and Human Abilities: Educational Psychology (New York: Harper & Bros., 1961), p. 155.

[2]Arthur I. Gates, Educational Psychology (New York: Macmillan Company, 1942), p. 411.

[3]Klausmeier, op. cit., p. 173..

items 3 and 5 could be carried out by the student as he attempts to acquire factual information.

1. Organize factual material into appropriate learning units.
2. Secure the correct response on the first try.
3. Reinforce correct responses; correct errors immediately.
4. Practice and review until the facts are firmly established.
5. Aid the learner to evaluate his own responses.[1]

The above principles apply only to factual material. Progression up the hierarchy in the formation of concepts requires more and more active searching and exploration on the part of the learner.

A thorough comprehension of the basic facts and the ability to recall them are fundamental to the learning of any subject content. It is of utmost importance, therefore, that teachers be cognizant of their responsibilities in this area of instruction. However, in the last half of the twentieth century, the mere teaching of facts is not enough. Educators must help students go beyond facts toward the formation of concepts. Students must learn to integrate many facts into the larger system of relationships, to sense regularities and relationships between events, and to discard the irrelevancies.

After acquiring the facts, the learner must uncover the relationships existing among them. Then the simple relationship is built between two or more ideas. Remembering

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[1] Ibid.

hundreds of unrelated facts would be a cumbersome and useless mental task. To facilitate memorizing and give meaning to the factual information, students must find the generic elements in the enormous mass of information by condensing and coding the information to be learned.

> A coding system may be defined as a set of contingently related, nonspecific categories. It is the person's manner of grouping and relating information about his world, and it is constantly subject to change and reorganization[1] . . . Individuals use a coding system to organize arrays of diverse information--rendering things into equivalence classes, capable of learning the probabilistic relationships between events belonging to various classes, and capable of manipulating these classes by the utilization of certain formal coding systems. Coding involves being able to isolate the defining properties of the class of events to which the present situation belongs.[2]

The generic relationships revealed by means of the coding system may then be used in thought. Bruner states that "Facts simply learned without a generic organization are the naked and useless untruth."[3] Bruner further states that the manner and the degree with which newly learned information is coded generically can be influenced in a transient way by

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[1]Jerome S. Bruner, "Going Beyond the Information Given," Contemporary Approaches to Cognition (Cambridge: Harvard University Press, 1957), p. 46.

[2]Ibid., p. 44.

[3]Jerome S. Bruner, "Learning and Thinking," in Readings in the Psychology of Cognition, edited by Richard C. Anderson and David P. Ausubel (New York: Holt, Rinehart and Winston, Inc., 1965), p. 77.

situational instruction.[1] It is through the use of the techniques of discrimination, abstraction, and generalization that the student progresses from the facts level of learning to the knowledges level. In succeeding learning experiences, the student moves through the stage of acquiring factual information into the stage of gaining knowledges.

Gaining Knowledges

The second level in processing information, knowledge, is represented by the ability to combine two or more related facts to form a knowledge about particular things. Bruner believes that

> . . . The object of learning is to gain facts in a context of connectivity that permits the facts to be used generatively.[2]

> . . . Teaching specific facts without making clear their context in the broader fundamental structure of a field of knowledge is uneconomical . . . uninteresting . . . and does not provide for transfer.[3]

Again, by way of illustration in studying about life insurance:

> The student may learn that ordinary life insurance is purchased by individuals in amounts of $1,000 or more, that industrial life insurance is made available to workers through their employers, and that group life insurance is purchased under one master policy by a group of persons. Only by adding these

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[1]Bruner, "Going Beyond the Information Given," in Contemporary Approaches to Cognition, p. 53.

[2]Jerome S. Bruner, "Learning and Thinking," Harvard Educational Review, XIX (1959), pp. 184-185.

[3]Bruner, The Process of Education, p. 31.

> and similar factual items together does one gain the knowledge that life insurance is made available to individuals in various forms.
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> Similarly, the student may learn that the proceeds of a life insurance policy may be taken in a lump sum, that term insurance offers temporary protection for the period of time that the policy is in force, and that the person named to receive proceeds of a life insurance policy is the beneficiary. By adding together these and other related facts the student gains the knowledge that one function of life insurance is protection.
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> Continuing in this manner the student may gain additional knowledges such as that the mortality table is a tool of the insurance industry, that health insurance provides assurance of income, and that life insurance provides funds for consumer spending in terms of replacement of the economic value of human lives lost.[1]

In this insurance application of learning, the facts are no longer entertained in isolation, but are seen in their interconnections and relationships. The knowledges, therefore, consist of the logical propositions based upon those facts. Through the thought process, logically consistent relationships can be systematically elaborated. If the reasoning is done correctly, the knowledge is related to the facts in the manner of necessary implication. Knowledges are more useful than facts because they are more general and therefore more widely applicable.

An individual who has gained knowledges does not possess a vast collection of isolated items. The knowledges he has are characterized by specificity, they are derived

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[1]Gerald A. Porter, "Concept Formation," unpublished manuscript (Norman, Oklahoma: College of Education, University of Oklahoma).

from and based upon related facts. Movement from the factual level of learning to the knowledge level involves singling out or discriminating among the important facts, then grasping the relationships among them and generalizing to derive abstractions from them.

The number of necessary conditions for the development of a knowledge and exactly what conditions are sufficient cannot yet be stated. In all likelihood they will turn out to be a matter of (a) the organization, number, sequencing, or timing of the specific facts presented to the individual, (b) the reinforcements given to the individual's responses, and (c) the individual's level of maturity, orientation to the subject matter and attitude toward learning. The test of whether or not an individual has formed a knowledge is the ability to respond correctly and reliably to new positive and negative instances of it.

Once students have gained possession of facts and have generalized certain of them into knowledges, they should be challenged to move on to the next higher and more complex level of learning. The next step should be in the direction of developing understandings through problem-solving in decision-making circumstances. The learning stage wherein two or more knowledges become interrelated and are generalized into an understanding is more abstract and complex than the stage at which knowledges are formed.

Developing Understandings

Understandings are developed from the discernment, comprehension, and interpretation of many facts and two or more knowledges. An understanding, higher on the scale of complexity than a knowledge, is derived from more knowledges brought into some form of functional relationship. Continued experience with the same information is transformed into a relatively meaningful pattern of comprehension as the content is examined over and over again in an ascending spiral. This implies that the individual is constantly engaged in an inner process of integration to find meaning and completeness in the subject matter.

To illustrate this step of developing understanding, let us assume that a student has studied insurance facts and gained the following knowledges in addition to those indicated in the preceding section:

1. Life insurance companies own property and provide employment for many people.
2. The cash value accumulated in an insurance policy constitutes savings.
3. Life insurance companies may take different forms and operate differently in the various states.
4. Insurance is often essential to financial security for people in retired status.[1]

By using all of his knowledges about life insurance in the proper manner in a problem-solving situation, the student may be expected to develop the understandings that:

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[1] *Ibid.*

1. Insurance consists of mutual sharing of risks that cannot be avoided.
2. Insurance helps to ensure maintenance of the family as the basic unit in our national structure.
3. The life insurance industry endeavors to promote thrift.[1]

Students must define knowledges, categorize them, and generalize to reach understandings. Precisely the same techniques of discrimination, abstraction, and generalization are involved as are used in the development of knowledges. The techniques are equally important at every learning level.

The distinctively human goal in learning is to expand meanings beyond particulars to the larger patterns of understandings and concepts. Understandings are derived from recollection of past experience and present experience and perhaps imagination or events not yet experienced. There is continued enrichment and comprehension through the ever-expanding integration of experience. Understandings demonstrate the interaction of culture and environment. Comprehension of understandings enables an individual to interpret a situation and to predict outcomes if he proceeds in certain ways. The individual can interrelate the different dimensions of the subject matter in facing problem situations.

The development of understandings is not the product of repetition of data. It is attained through intently observing present problem situations, recalling past experiences which have some relation to them, and arriving at some

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[1] Ibid.

solutions. As the student practices the techniques of discrimination, abstraction, and generalization, there appears to be a gradual drawing together of significant elements of the situation until there is a full and even sudden dawning of understanding.

Understandings are not the products of memorization; they are the products of problem solving and thought. The individual must perceive a problem situation and seek to solve it. Experiences intended to provide understanding are a more advanced kind of teaching-learning and come after facts and knowledges are known. "Creative activity, critical thinking and problem solving are special activities which can be cultivated and used best at advanced levels of education."[1] Understandings possess a high degree of abstraction that is not meaningful except to persons who possess a considerable fund of knowledges in the subject area to which they apply.

The development of understandings demands problem solving situations, teaching-learning conditions where students and teachers are doing--where they are actively engaged in tryout and practice in the study of issues and problems related to the understandings under development.

> Problem situations form the basis for assimilating knowledge relationships in true understanding. When confronted with a problem, a student must bring his various knowledges into play in reaching a solution. In assembling certain knowledge relationships and applying them to the problem at hand, the

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[1] Woodruff, Basic Concepts of Teaching, p. 4.

> student actually grasps understanding in a logical and analytical manner. It is at this point that the teacher-student relationship takes on its greatest significance.[1]

In the problem-solving situation, the teacher must permit the students freedom to make mistakes and ask questions and to test their ideas. Students should be helped to perceive problems fully and clearly, and discussion should help them to recognize what they are seeing and organize their impressions into sensible and accurate mental understandings. There must be adequate time for comprehension of the relationships between the knowledges on which the understandings are based.

Problem-solving activity, one workable classroom method, supports inquiry within the framework of a particular and agreed upon problem. The data so far obtained are synthesized and the door opened to new and continuing inquiry. The problem-solving task usually involves a dimension of discovery. That is, the learner has to discover appropriate responses for solving the problem. "Teachers must not tell the students all the answers but should ask them the 'critical questions'--the questions that will urge the students to go from step to step until they have made a 'discovery.'"[2] Students must first organize the relationships between knowledges to provide the context for understanding.

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[1]Porter, unpublished manuscript.

[2]Sister Mary Petronia, "Guided Discovery Produces Creative Math Students," Mathematics Forum (Spring, 1967), p. 1.

The teacher must guide the student in his building of a graduated body of understandings covering the important aspects of the subject matter. The ideas become more inclusive and broader. The teacher's task is to bring students into contact with clear, graduated experiences from which they can generalize. Students need help in exploring and classifying phenomena around them in the search for meaning. They need help in sorting things out and putting them back into relationships. Thinking about knowledges to produce understandings is helped when the teacher makes proper use of such devices as large and small group discussions, lectures, special reports, and questions and answers.

It should be noted again that the proper aim of teaching is comprehension of major ideas rather than memorization of information. The way to achieve this is through a learning process that exemplifies the pattern of the subject as a whole.

Formulating Concepts

A concept is defined as an abstract idea conceived in the mind of an individual as he exercises his thoughts in the process of generalizing particular understandings, knowledges and factual information that he thoroughly comprehends.[1] Concepts are the unifying core ideas of a subject area to which

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[1]Definition formulated on the basis of careful analysis of the dictionary definition.

all the details reflect. They are the bigger aspects of content that the teacher wants the students to grasp. They are what is to remain once the student has forgotten all the details of the course.

Concepts are the most significant products of learning; they constitute the mental equipment with which we are best enabled to adjust to our world. Concept formation is, indeed, the goal toward which all the different outcomes of the various types of learning should be directed. Facts, knowledges, and understandings have value only in so far as they constitute the foundations for the development of concepts. Concepts, by their very nature, provide for the transfer of learning. When one learns a set of concepts, he can solve problems he has not previously encountered.

The formation of concepts is a gradual expansion of comprehension, somewhat like dropping a pebble into calm water. The resulting ripple extends in everwidening circles. Through the formation of concepts, students are helped to see the relationship between what is learned today and what was learned yesterday, last week, or the week before. The facts to be learned first about any topic should be the most basic ones, having meaning on which later concept formation depends.

A concept is a synthesis, a conclusion, from which predictions can be made. It is derived from facts, knowledges, and understandings. If one wishes to comprehend a concept thoroughly he must learn some of the specific instances on

which it rests through the acquisition of facts, knowledges, and understandings. Concepts can seldom be conveyed to a student; he must add instance to instance and perceive the soundness of the concept that he formulates for himself.

Enabling a student to form a concept in a direct manner is apt to destroy its value; such a procedure is analogous to mere memorization of facts. The conclusive nature of the concept, its component elements, and its possible predictive value are likely to be obscured. The teacher must help the student identify, comprehend, and apply the concept. The most useful concept is the one the student forms for himself. Therefore, the teacher must provide examples, identify materials, and help the student to assemble related instances. The student must himself generalize, see relationships, and draw the synthesizing conclusions.

Again, to illustrate with the topic of insurance, the student may gain the understanding indicated in the preceding section and additional understandings as follows:

1. Planned insurance programs contribute to the creation of individual estates.
2. Insurance agents and companies endeavor to exercise an attitude of "corporate citizenship."
3. Insurance helps to promote individual self-reliance.
4. The insurance industry helps to educate people relative to family finance.
5. Insurance is not the only desirable thing in life.[1]

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[1]Porter, unpublished manuscript.

By reflecting about these and other similar understandings, the students form such concepts as the following:

1. Insurance is a stabilizing force in our economy.
2. Insurance aids in maintaining and enhancing the standard of living.
3. Insurance contributes to the initiation and expansion of business enterprises.
4. The insurance industry provides support to development of the best possible kind of competitive economic system.[1]

Concepts are formulated by reflective thinking about combinations of two or more understandings, and are typically formed via verbal statements that provide the cues for recall of component understandings and their relationships. Concepts require high levels of critical and reflective thinking and they are slow in developing, requiring the support of carefully planned instruction. The processes of discrimination, abstraction, and generalization are used as in gaining knowledges and developing understandings. In assisting pupils in formulating one or more concepts, the teacher may decide to proceed inductively or deductively.

There is considerable value in concept formulation as an element in teaching-learning. The larger ideas develop gradually and are tested, all along the way, for their power to simplify information, to predict, and to order information into meaningful sets of relationships. The concepts support the generation of new hypotheses and the ordering of new information and new experiences. The formation of concepts

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[1] Ibid.

simplifies the diversity of information within a field. This power of simplification is what Bruner refers to as "the economy of a structure." Through concept formation, learning is consolidated thus reducing the complexity of one's world and providing for the transfer of learning.

> One of the most notable things about the human mind is its limited capacity for dealing at any one moment with diverse arrays of information. It has been known for a long time that we can deal only with about seven independent items of information at once; beyond that point we exceed our "channel capacity," to use our current jargon. We simply cannot manipulate large masses of information. Because of these limits we must condense and recode . . . Facts simply learned without a generic organization are the naked and useless untruth. The proper reward of learning . . . is that we can now use what we have learned, can cross the barrier from learning into thinking.[1]

Through the previously described process, structuring of content permits the envelopment of the key ideas and concepts that will be essential to all later learning and living. Concepts or "representative ideas" represent large quantities of information, disclosing the essence of a subject area. If the formation of concepts is the main focus in the process of structuring information, ". . . to economize learning effort it might be urged that these representative ideas be taught, leaving out all unnecessary details."

> Such a view of the principle of representative ideas or concepts in teaching is quite mistaken. Instruction on such a basis would prove completely ineffective. . . . In the beginning stages representative

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[1]Jerome S. Bruner, "Learning and Thinking," in Readings in the Psychology of Cognition, pp. 77-78.

> ideas are for the guidance of the teacher . . . and not directly for the student. Later . . . they may prove as useful to him . . . as they are for the teacher. The essential point is that at every stage of instruction the representative ideas should govern what is taught . . . The good teacher . . . chooses each item or experience with the deliberate purpose of giving substance to certain basic concepts that are distinctive of the discipline studied . . . The place of the representative ideas is not in the first instance on the lips of the teacher, but in his mind, to direct him in the choice of learning experiences that will illustrate the ideas he has in mind. In the arts, for example, not much would be learned if the teacher talked about individual perceptual forms. What is required is a series of experiences all of which exemplify concern for the unique perceptual object.[1]

The formulation of concepts through the acquisition of facts, the gaining of knowledge, the development of understanding and the formulation of concepts utilizing the techniques of discrimination, abstraction, and generalization at each level create a design or pattern. The design focuses upon the forming of concepts to be reflected in a behavior or attitude. This approach to the formulation of concepts has much in common with programmed instruction. Both programmed instruction and the process for structuring content "capitalize on the principle that understanding of relationships facilitates retention."[2] The process of structuring information presented here does seem to allow more opportunity for independent thought.

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[1]Phenix, op. cit., 325.

[2]Bernard, op. cit., 414.

The formation of concepts requires a complex kind of internal processing through facts, knowledges, and understandings. The concept, then, becomes the basis for the establishment of certain behavior or attitude. Concepts usually are formulated under conditions that have two major requirements: (1) the component facts, knowledges, understandings must be previously learned and readily recallable and (2) the student must be able to see the relationships among the understandings and verbalize them into concepts. The only exception is when the teacher chooses to use the deductive method, in which case the concept is "given" to the students. Through reflective thought and research, the student then develops the underlying facts, knowledges, and understandings. In any case, ultimate comprehension of the concept indicates comprehension of the components.

Because concepts are derived from facts, knowledges, and understandings, to acquire a concept is to comprehend an extensive amount of subject content. There is a danger that students will treat concepts as empty forms and try to memorize them without comprehending the specifics from which they are derived. This can be obviated by having each student formulate the concept <u>in his own words</u> as he attempts to generalize the relationships he finds from the concrete cases which he encounters, and by asking him to give illustrations of the concept.

It is hypothesized that concepts are formulated or derived from combinations of previously developed understandings. The student who hears for the first time the concept, "Insurance is a stabilizing force in our economy," cannot be expected to comprehend it. He will comprehend fully only if he has the background of prerequisite facts, knowledges, and understandings. Educators may wonder how many prerequisite facts, knowledges, and understandings are needed and how well those prerequisites must be comprehended for the concept to become useful. Also, is there a difference in the rate of learning the concept, depending on how recently the component elements have been recalled?

Some additional conditions relevant to the forming of concepts center upon the event of combining the understandings that make up the concept. Because it is best to enable students to formulate their own concepts, what is the most effective way to use words to guide them?

> Certain active lines of research can be identified which bear upon this question. First, one thinks of the work on programmed instruction that is more or less specifically oriented to this problem (Glaser, 1965), including work on cueing and prompting size of step, and response requirements. Second, there is the somewhat scattered but nevertheless important research on learning by discovery (cf. Keislar and Shulman, 1966). Broadly speaking, this area of investigation deals with the amount and kind of cueing provided by words in principle learning. Discovery learning may be said to occur under conditions in which minimal cueing is given, whereas reception learning (Ausubel, 1963), takes place when words are used to state the principle fully. Various intermediate amounts of cueing represent "guided discovery" (cf. Gagne, 1965, 1966). The question of the

> effectiveness of different kinds and amounts of guidance in discovery continues to be an important one for research.[1]

As indicated in the above paragraphs, there is much to be done in conducting scientific research in various areas on the forming of concepts. The only sure sign that the student actually has command of a concept is transfer or a behavior change reflecting an attitude.

Many successful students have undoubtedly used the process of discrimination, abstraction, and generalization to consolidate learning and find meaning in subject areas. They may not, however, have consciously progressed through the four steps presented thus far and developed the structure in written form. To sequence the development of concepts in four definite steps and to express concepts in written form at each level requires much special ability. One argument in favor of having the five steps described in this research study is that a student must progress from very simple and concrete ideas to very complex and abstract ideas. In the beginning educators find it difficult to distinguish exactly the five levels and to write a concise and descriptive statement about it as Porter has done. The ability to recognize the four levels and to express them in writing can be improved with practice. A perceptive person ultimately becomes

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[1]Robert M. Gagne, "The Learning of Principles," in Analyses of Concept Learning, edited by Herbert J. Klausmeier and Chester Harris (New York: Academic Press, 1966), p. 81.

able to read a statement in a book and know immediately whether the statement is a fact, knowledge, understanding, or concept. The point to be made here is that students should not be discouraged if using the process presented does not come simply and easily.

Shaping Attitudes

The only sure sign that the student actually has command of a concept is transfer or a behavior change reflecting an attitude. The fifth and final step in the process for the structuring of information involves the forming of appropriate attitudes or ". . . permanent desirable changes in the behavior patterns of the individuals to whom the instruction is offered."[1]

> An attitude is a persistent disposition to act on the basis of conviction or feeling either positively or negatively toward a person, group, object, situation, or value.[2]

Attitudes are reflected in the behavior exhibited by an individual; in the way he chooses to live his life. Attitudes cannot be taught directly, yet the shaping of attitudes is the principal reason for teaching, the most desired outcome of education.

Much too little is known about how to teach and test for attitudes. The hypothesis here is that if relevant facts

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[1]Porter, unpublished manuscript.

[2]Definition formulated on the basis of analysis of dictionary definition.

are built up to appropriate knowledges, understandings, and concepts, permeated by thought, the result will be desirable attitudes.

> To illustrate the formation of an attitude based on the facts, knowledges, and concepts previously presented, let us follow through with the insurance topic. It may be assumed that in a single unit of instruction relative to life insurance not more than one attitude would be sought. It might be described as follows:
>
> Life insurance (actually the total insurance industry) contributes significantly to the total economy of our nation. It helps to provide the fuel required to keep our economy healthy. Basing my thinking on these beliefs, I am willing (even eager) to explore the possibilities in life insurance for myself and my family. I will seek help from a reputable representative of a reputable insurance company in developing an adequate insurance program.
>
> Although there are several major ideas indicated in the description of the attitude which can be formulated from certain concepts of life insurance, there is truly one such attitude. That attitude exemplifies <u>appreciation of the good things done through insurance programming for individuals and the nation in which we live</u>. The holder of this or a similar attitude relative to insurance would undoubtedly be motivated sufficiently to cause him to exercise a behavior pattern resulting in adequate insurance coverage for himself and his family.[1]

This ultimate behavior change is the goal of all instruction. A single learning experience will seldom have such a profound effect upon a learner. Considerable time and experience are required for changes in the concepts and attitudes of students to take place. Perhaps one advantage of the process for structuring information presented here is that experience is gradually transformed into a relatively meaningful pattern as

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[1] Porter, unpublished manuscript.

the content is examined over and over in a spiral fashion, the generalizations becoming broader at each level. Learning is carefully organized over time so that the content is structured systematically to implement the student's reaching a relatively high level of comprehension. The structure not only simplifies understanding but reveals significant patterns and relationships. Once teachers have led students upward and onward in advanced thinking to the formation of concepts, the subject matter becomes not a meaningless manipulation of symbols; rather, it becomes a powerful thinking tool.[1]

The challenge confronting educators is to develop a teaching-learning situation that will be conducive to desired modification in the attitudes and the behavior patterns of people.

> Our aim as teachers is to give our student as firm a grasp of a subject as we can, and to make him as autonomous and self-propelled a thinker as we can--one who will go along on his own after formal schooling has ended.[2]

What is presented here is a process for structuring information leading to the formation of the fundamental ideas or concepts that hopefully will result in desirable behavior changes.

> Mastery of the fundamental ideas . . . involves not only the grasping of the general principles, but

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[1]Marilynn J. Adler, "Some Educational Implications of the Theories of Jean Piaget and J. S. Bruner," Canadian Education and Research Digest (March, 1965), p. 12.

[2]Jerome S. Bruner, "The Act of Discovery," Harvard Educational Review, XXXI (1961), p. 22.

> also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving one's problems on one's own.[1]

A student who has developed the ability to structure information, will be able to continue to use the process for developing fundamental ideas and concepts when his formal school attendance is ended and there is no teacher present. The "teacher" then becomes a book or an article--some information to be learned. Properly used, content structuring can be very effective and useful in cognitive study.

Summary

The five-step process for structuring content was designed to help students formulate broad concepts and fundamental ideas. To formulate broad ideas, students must first observe carefully the properties and characteristics comprising the factual information in their environment. They must then classify and categorize the facts in terms of certain distinctive characteristics. Students must observe and describe the relationships, interactions, and interdependence of the things they observe to gain knowledges, develop understandings, formulate concepts, and finally to reflect desirable behavioral patterns.

Completion of the five-step process results in a composite design or pattern indicating the hierarchical arrangement of the ideas--facts, knowledges, understandings,

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[1]Bruner, The Process of Education, p. 20.

concepts, and attitudes. The techniques of discrimination, abstraction, and generalization are utilized in moving from a base of factual information to the broad concepts and fundamental ideas and hopefully to result in the ultimate aim of education--desirable behavior patterns.

Though the five-step process for structuring subject content has not been formally tested in the classroom, the process has been used with apparent success by Porter at the University of Oklahoma. The process, based on analytical logic utilizes thought in moving upward from the factual information to the broad ideas.

As a perhaps unique kind of summary for this entire chapter, an illustration of the use of the five-step structural process is presented on the page that follows. The illustration indicates only in part how the content of "life insurance" may be structured for greater meaning and easier comprehension by students.

ILLUSTRATION OF THE FIVE SIGNIFICANT STEPS I

Area of Study: Life Insurance--Items in each of the five columns are il attitude toward life insurance, teachers and students would stud understandings, and concepts than are presented here.

FACTS	KNOWLEDGES	UNDE
The population increase from 1960 to 1967 was 180,676,083 to 200,004,100. Approximately 80% of the population lived in urban centers in 1960; in 1967 84% were urbanized.	Population growth and concentration have increased the risks faced by individuals in society.	As the popu social and tions becom lead to ris insured if be maintain societal in
Life insurance may be purchased in multiples of $1,000. Ordinary life insurance is the principal type of life insurance purchased to meet individual needs. Policy benefits are paid to beneficiaries upon death of the insured.	The function of life insurance is protection against loss of income from the insured.	
Insurance policies are purchased from agents of insurance companies. A small, regular amount paid for insurance is called a premium. Premiums may be paid monthly, quarterly, semi-annually or annually.	Through regular premium payments various types of insurance may be acquired	Family unit promoted as sume mutual bility for
The common risks of loss of life are fundamental to man's existence. Through insurance economic risks are shared.	Most people face similar risks, any of which may lead to economic loss.	
Insurance may be acquired to cover the loss of human life. Both temporary and permanent types of life insurance may be purchased. Group insurance is purchased through one master policy.	Life insurance is available to individuals in many forms.	Through th many kinds insurance possible f Americans and other nature.
Money accumulated by insurance companies to pay future claims is known as reserve. Loss of income insurance may provide up to 75% of the normal earnings of an individual Life insurance death benefit payments in 1967 reached $5.7 billion.	Life insurance benefit payments, made as the result of economic loss, provide funds for continued consumer spending.	
More than 650,000 Americans were employed in the life insurance business in 1967. Real estate investments made in 1967 by life insurance companies totaled $5.2 billion.	Life insurance companies own property and provide employment for many people.	The insur able to p through p have help standard
In 1967, $177.4 billion of policyholder's funds were at work through investment. Life insurance funds are invested in homes, farms, government, business and industry.	Investments made by life insurance companies promote individual and national economic growth.	

Illustration 2.--Five Significant Ste

IFICANT STEPS IN STRUCTURING CONTENT

columns are illustrative only. In the formation of the suggested
ents would study and analyze a great many more facts, knowledges,
ere.

UNDERSTANDINGS	CONCEPTS	ATTITUDE
As the population increases, social and economic interactions become more complex and lead to risks which must be insured if the family is to be maintained as the basic societal institution.	Through insurance, fears and anxieties are minimized and people are able to realize more fully their potential for living.	Insurance is the base upon which individuals and/or families should build to establish the kind of financial security that is essential for personal and social economic growth and stability.
Family unity and security are promoted as individuals assume mutually the responsibility for risks.		
Through the design and sale of many kinds of protection, insurance companies have made possible for millions of Americans financial stability and other benefits of a social nature.	In both personal and social economic terms, the insurance industry has facilitated the financial growth required by a dynamic nation and has supported economic stability.	
The insurance industry has been able to pool resources which, through prudent investments, have helped provide a higher standard of living.		

CHAPTER IV

SUMMARY

This study was based on the belief that facts should not long be allowed to exist in isolation but should be continually used to form the larger truths and patterns which are needed if man is to more fully comprehend his world. Most of today's teaching-learning situations do not help students build these larger relationships. Often, the students memorize the facts, regurgitate them at examination time, and then forget them as quickly as possible. The factual information is seldom made meaningful and useful.

This is not to say that facts are not important. The relevant ones are. If the facts can be made useful through development of their broader meaning, students will be more likely to remember them as well as their broader implications. Learning should not stop at the factual level, but students should be helped to go beyond the facts to their broader meaning. As the larger meaning is formed into patterns or mosaics, the students can then insert new information as it is encountered into the existing pattern.

An efficient and effective way of helping individuals see the broad meaning of factual information is through the

process of structuring information. The end result of the process presented in this study is a five-step structure of content. However, the structure itself is important only in that students are helped to comprehend the process, the method of thinking that will enable them to see the broader meaning and develop a structure of content for themselves in all learning situations. Hopefully, if students see the advantage of structuring information to focus upon the broad concepts, they will use the process in additional learning though their formal education has ended. Only if citizens see the broad picture of issues and problems at hand can they make intelligent decisions. Decisions made only on the basis of immediate public opinion and news media presentations can be detrimental to our society. Decisions must be made upon careful thought and placement of facts into the broader meaning. Citizens must develop the ability to structure facts, to see their interdependence and interrelatedness, to see the larger patterns of causes, results, and relationships. Educators have the responsibility not only of presenting information, but of presenting it in a way that students see its connectedness and pattern. Educators, then, must focus not only upon content but also upon methods of thought. Through utilization of the thought process, students can categorize ideas, comprehend their relationship and formulate a general idea or abstraction. To focus upon the fundamental ideas and broad concepts, information must be structured. The purpose

of this study was to set forth a process for structuring any kind of cognitive content.

Restatement of the Problem

The problem of this study was to isolate and to define some of the authoritative bases in the structuring of content that is to be learned, to describe a structure that was developed by means of analytical logic, and to demonstrate the use of that structure with certain content pertinent to life insurance.

The study was delimited to one aspect of the teaching-learning situation--the structure of a body of knowledge. The particular process suggested for structuring any kind of cognitive content involves: (1) presenting facts in appropriate informational categories, (2) dealing with these facts in ways that reveal relationships which can be built up to knowledges, (3) putting those knowledges to work in problem-solving, decision-making circumstances so that broader understandings are developed, (4) subjecting those understandings to reflective thought so that in-depth mental images or concepts are presented or personally formulated, and (5) providing conditions wherein the concepts are exercised in action that prescribes or reveals attitudes held.

The procedure for completing this study involved extensive library research bearing both directly and indirectly upon the problem. The research involved an in-depth study of

the psychological and educational processes applicable to the structuring of subject matter content; the application of psychology and logic to further define, refine, and evaluate the five-step approach set forth by Porter at the University of Oklahoma; and illustration of the use of the established process in developing a structured content pattern for the topic of "life insurance."

Major Ideas in This Study

The nature of this research study was such that the development of findings of the type usually set forth in doctoral dissertations was not appropriate. Instead of findings, therefore, major ideas are presented.

1. Subject content should be structured to help students go beyond the factual information to recognition of the interrelationships and interdependence of facts as the basic elements in the formation of broad concepts. A major proponent of the idea of structuring content is Jerome S. Bruner. His work has been extensively reinforced by Gagne, Taba, Woodruff, Schwab, and others.

2. A five-step process for structuring cognitive subjects has been developed and used with apparent success by Gerald A. Porter at the University of Oklahoma over a period of ten years. The process includes acquiring basic factual content; gaining knowledges and beginning to exercise the techniques of discrimination, abstraction, and generalization;

developing understanding through experience and problem solving activities; reflecting upon the understandings to formulate concepts; and finally the exercising of attitudes to result in some action or behavior change.

3. The structural process is solidly based on analytical logic and necessitates utilization of the techniques of discriminating, abstracting, and generalizing to move from a base of factual information to the broad concepts. The structure presented here is developed through a process rather than being developed upon a given system of prerequisites.

4. The structure is based upon a hierarchy of ideas which enables individuals to move from the lowest level of learning of facts toward formation of the broad concepts and fundamental ideas. The process leads step by step to the more mature levels of thought and ideas based upon the ability to see relationships.

5. The structure is a practical application of the principles set forth by Bruner. The process is developed inductively and allows for "revisiting" of the subject content and avoids premature symbolization. Because a single learning experience is usually not sufficient for the forming of a concept, the structure is built on a succession of learning experiences with the same information.

6. Students need problem solving experiences with factual information to enable them to relate the factual items

to the broader ideas. The structure involves not only the building of broad concepts, but also provides patterns for the reconstruction of ideas already held or later encountered. The structure provides ample opportunity for reinforcement, a widely accepted principle of improved learning.

Concluding Statements

On the basis of extensive research, of three years of experience as a graduate assistant in family finance education, and of more years of personal observation in teaching-learning situations, the following conclusions were reached:

1. The logical analysis applied in this study provides adequate bases for support of the idea that subject matter content must be structured if it is to be maximally useful and meaningful.

2. The five-step process for structuring content that is presented in this report was developed by means of analytical logic and supported by recognized authorities in education. It is illustrative only of one way of structuring content and educators should understand that other processes may be designed with fewer or greater number of steps or stages, any or all of which may be decidedly different from those in the illustration used here.

3. The logic in the five-step process demonstrated in this report and the use of the five-step process in family financial education at the University of Oklahoma indicate

that it works well with subject matter content such as insurance, credit, buying, savings, investing, taxation, and that it probably can be made equally effective when applied to other cognitive subject matter content.

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