APPLICATION OF SOCIAL SCIENCE STRUCTURAL GENERALIZATIONS AS A FUNCTION OF PREVIOUS SOCIAL SCIENCE COURSEWORK

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This is to certify that the

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ABSTRACT

APPLICATION OF SOCIAL SCIENCE STRUCTURAL
GENERALIZATIONS AS A FUNCTION OF PREVIOUS SOCIAL
SCIENCE COURSEWORK

By

Alan John Hoffman

Problem

The purpose of this study was to determine whether there was a relationship between the amount of university social science coursework a student had taken prior to his entrance into an elementary social studies methods course and his ability to (1) identify social science structural generalizations and (2) construct hypothetical teaching questions related to those generalizations. If this relationship was shown to exist, the researcher then wished to determine whether such results were, in part, due to a second independent variable, namely, level of cognitive complexity. Null hypotheses were thusly set up which predicted that no relationship would exist between amount of university social science coursework taken and performance on either identification of social science structural generalizations or levels of questions constructed.

Procedures

One hundred thirty-three undergraduate students taking a social studies methods course in elementary education at Michigan State University served as the population. Students viewed twelve slides and accompanying written descriptions from a social science oriented program designed to teach elementary children concepts and generalizations related to urban education. The students then identified from the program major social science generalizations which they might attempt to teach to children, and wrote important questions they might pose to children in developing these generalizations. A panel of social science educators had previously viewed the program, and a criterion measure based upon those elements which most clearly illustrated structural learnings had been built. A measure of cognitive complexity was also given to the students. The data was then analyzed by three raters with extensive social science experience, and inter-rater reliability estimates were established.

Findings and Discussion

A. When social science experience was defined solely on the basis of number of quarter-hours of university social science credits taken, no significant relationship was found with each of the dependent variables (number of structural generalizations identified and levels of questions constructed).

This study supported the contention that previous social science courses are largely ineffectual in influencing a student's ability to inductively identify structural social science learnings drawn from some social science oriented material. It confirms those recent studies in cognition which have tentatively indicated that one's ability to discover relationships is directly related to being taught primarily by inductive modes of instruction.

B. When social science experience was determined on the basis of the pre-service teacher's major outside of elementary education, two relationships, though not significant at the $\alpha = .05$ level, emerged. First, elementary education students with academic majors in the social sciences and in mathematics-science identified more structural generalizations drawn from the social sciences than did majors in elementary education English and fine arts (significance of $F = .087$). The question of why students with a background in either mathematics-science or social science tended to identify more structural generalizations than did students with a background in English or fine arts could only be speculated upon since this study attempted to determine whether that relationship was due to previous social science coursework or level of cognitive complexity. Further research is clearly needed here to explore other possible causative factors. Possible cause may be inherent in the different problem solving orientation and related specialized reading skills of the four academic majors.

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Secondly, students majoring in elementary education with strong backgrounds in mathematics and the sciences were found to be better able to conceptualize than were other emphasis majors. This finding was viewed as somewhat surprising when one considers that the results were based upon a cognitive complexity score derived from the students' responses to a concept drawn from the social sciences.

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By

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DEDICATION

Three people have influenced my life profoundly through their particular strengths. This thesis is thusly dedicated to my father, for his deep wisdom and understanding; to my mother, who taught me true compassion for the less fortunate; and finally to my wife, Judith, whose courage and strong character in every sense of the word have carried me beyond my wildest expectations.

ACKNOWLEDGMENTS

The completion of this study is in large measure the result of continual cooperation and the encouragement of several individuals. Those deserving particular mention are included below.

The writer is deeply indebted to his doctoral committee chairman, Dr. William W. Joyce. His guidance and insight served as constant sources of renewed effort on the writer's part.

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CHAPTER I

NATURE AND BACKGROUND OF THE STUDY

Two major concerns served as the focus of Chapter I. Initially, a problem was identified and delineated. Secondly, a review of the literature which influenced the direction and modification of this study was presented.

Introduction to the Problem

A major objective of social studies education has been to develop within the learner the ability to transfer abstract knowledge and skills to new situations. To better meet this objective, educators charged with the responsibility of developing social studies curricula have attempted to select content that possesses general applicability.[1] Recent content emphasis has been upon structural learnings identified from the social science disciplines having most relevance to social studies education.

Teachers of social studies need first of all to "see" structural learnings inherent in social studies materials. These central learnings should be generally consistent with

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[1]Cecil J. Parker and Louis J. Rubin (ed.), Process as Content: Curriculum Design and Application of Knowledge (Chicago: Rand McNally and Co., 1966), p. 13.

those generalizations which have been posited by scholars in the social science disciplines most related to the social studies.

Secondly, after recognizing a potentially worthwhile generalization, teachers need to be able to select appropriate strategies which will facilitate immediate learning and eventual transfer on the part of youngsters.[2] Inductive teaching strategies have been shown to facilitate greater transfer to novel learning situations.[3] The teacher's ability to construct questions which require students to use cognitive skills in the solution of problems has been identified as crucial to this process of teaching.

Statement of the Problem

One component of the professional sequence of courses that pre-service teachers are often required to master are those commonly referred to as "methods" courses. Typically, students entering this portion of their professional sequence differ greatly in academic background, intellectual capacities, and teaching aspirations. Provision for such individual differences has been difficult and has many dimensions beyond the scope of this investigation.

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[2]Hilda Taba, "Learning by Discovery: Psychological and Educational Rationale," Elementary School Journal, 63 (March, 1963), pp. 308-316.

[3]See, for example, J. M. Scardura, "An Analysis of Exposition and Discovery Modes of Problem Solving Instruction," The Journal of Experimental Education, XXXVII (Winter, 1964), pp. 149-157. This and other related studies are reviewed later in this chapter.

This study was particularly concerned with determining whether differences in academic background prior to the "methods" sequence could be shown to have an affect upon a student's ability to generalize. Clearly, if students could be shown to perform differently based upon previous academic background, some provision to meet these differences at the "methods" level should be made.

Purpose

The problem of individualizing instruction is particularly acute with regard to students who plan to teach social studies. This curricular area draws its content from widely diffused areas which include six particular social science disciplines, namely, history, geography, political science, economics, anthropology, and sociology.

This study focused upon one particular aspect of the generalizing process. Specifically, it attempted to determine whether there was a relationship between the amount of social science coursework a student had taken prior to his entrance into a social studies methods course and the student's ability to (1) identify social science structural generalizations and (2) construct hypothetical teaching questions related to these generalizations.

If students with an extensive social science background could elicit more social science structural generalizations than students with a limited social science background and if these students could construct more high quality questions, the need for differential treatment at the "methods" stage would seem obvious. If, as some would attest, there is no difference with respect to the above, questions should arise as to <u>why</u> social science university course exposure does not significantly affect the performance of these prospective teachers.

A limited amount of research has indicated that prior learning facilitates understanding and utilization of generalizations.[4] If these findings were substantiated here, i.e., that previous social science coursework was shown to facilitate identification and utilization of related generalizations, another concern should be raised. Were such differences primarily the result of greater familiarization with social science terminology or rather the result of superiority in identification and application of structural learnings? While this question was not the primary concern of this study, some information was collected which could be related inferentially.

Studies in cognition have offered more evidence in support of the notion that complexity in thinking is a multifaceted phenomenon, i.e., that a person's ability to generalize is in part a function of the content area and not

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[4]Two early studies (1928, 1931) are reported in Frederick J. McDonald, <u>Educational Psychology</u> (2d ed.; Belmont, California: Wadsworth Publishing Co., Inc., 1965), p. 221.

a unitary phenomenon.[5] A measure of cognitive complexity was used in this study to determine whether elementary education social science majors as one population were cognitively more complex in response to a social science concept than were other populations.

Prospective elementary education teachers with an academic major in social science were compared with prospective elementary education teachers having academic majors in mathematics-science, English, and fine arts. In addition, prospective teachers of special education were compared with the social science emphasis group. These pre-service teachers were all enrolled in a social studies methods course at Michigan State University during Winter Term, 1969. The five groups and the mean number of quarter-hours taken in the social sciences are shown in Table 1.1.

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[5]For a review of studies done with various cognitive complexity measures and a more complete rationale for support of the multifaceted view of complexity, see Siegfried Streufert and Michael Driver, "Impression Formation as a Measure of the Complexity of Conceptual Structure," Educational and Psychological Measurement, 27, No. 4 (Winter, 1967), pp. 1025-1039.

TABLE 1.1.--Group Size and Mean Number of Social Science Quarter-Hours Taken By the Five Group Majors

Group	N	Mean Number of Social Science Quarter-Hours Taken
Social Science	31	44.3
Mathematics-Science	28	22.0
English	22	21.5
Fine Arts	21	20.8
Special Education	31	17.0

Limitations of the Study

The following limitations necessitated restricting this research endeavor to an exploratory study.

1. A review of the literature revealed no previous research which had focused upon measuring transfer of previous social science learnings to new situations. Therefore, measures constructed here represented an initial attempt to assess this ability as it related to identification of structural generalizations.

2. The population sample selected for this study represented one specific class within one institutional setting. The results obtained were not generalizable to other intra- and inter-university settings without replication.

Hypotheses

The following major hypotheses were constructed on the basis of those relationships which were seen as salient to this study.

H_{o_1} Students varying in social science background will not differ in the ability to identify social science structural generalizations.

H_{o_2} Students varying in social science background will not differ in the ability to construct high level questions.

H_{o_3} Students varying in social science background will not differ in performance on a cognitive complexity scale.

H_{o_4} There will be no relationship between level of complexity and number of social science structural generalizations identified.

H_{o_5} There will be no relationship between level of complexity and levels of questions constructed.

Assumptions

This study was predicated upon these assumptions:

1. That teaching for structural generalizations facilitates transfer to unique situations and aids in retention of specific information.

2. That asking high level questions is a desirable teaching strategy which will result in stimulating high level thinking on the part of the learner.

3. That "acceptable" structural generalizations can be measured.

4. That ability to construct high order questions can be measured.

Definitions

The following terms require definition owing to their specialized use in this study.

Structural Concept. McDonald has defined a concept as a classification of stimuli having common characteristics.[6] Structure as used in this study refers to tentative relationships which attempt to describe the most salient aspects in one or more of the social science disciplines. For example, scarcity has been identified as the major organizational concept of the discipline of economics. The concept of culture has been described as a major organizational concept in both anthropology and sociology. Both are examples of structural concepts under the researcher's operational definition.

Structural Generalization. McDonald has defined a generalization as a statement of the relationship between two or more concepts.[7] Structure as used in this study refers to tentative relationships which attempt to describe the most salient aspects in one or more of the social science disciplines. For example, generalizations related to the structural concepts of scarcity and culture follow.

1. Since natural resources are limited and human wants are unlimited, every society has developed a method for allocating its scarce resources.

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[6] McDonald, p. 682.

[7] Ibid.

2. A person's culture, its mores and traditions, affects his thinking, perceiving and feeling throughout life.[8]

Both statements are structural generalizations under the researcher's operational definition.

High Order Questions. Questions which require the respondent to go beyond simply restating or rephrasing information presented. The ascending orders of difficulty of questions used in this study are those identified by Benjamin S. Bloom and others in Taxonomy of Educational Objectives, Handbook I: Cognitive Domain,[9] i.e., comprehension, application, analysis, synthesis, and evaluation.

Elementary Education. Students being certified to teach by the Elementary and Special Education Department at Michigan State University. This includes some prospective junior high school teachers. Possible certification range (K-9).

Special Education. Those pre-service teachers seeking certification in elementary education and special training related to working with "the blind, partially-seeing, crippled or home-bound, mentally retarded, deaf or

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[8]James G. Womack, Discovering the Structure of Social Studies (New York: Benziger Brothers, Inc., 1966), p. 3.

[9]Benjamin S. Bloom (ed.), Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: David McKay Co., Inc., 1956).

hard of hearing, and socially maladjusted and emotionally disturbed."[10]

Level of Complexity. One measure of cognition defined here as a weighted sum of the number of attributes a subject has in his concept of "urban education" and the number of distinct ways in which he can group these attributes.

Collection of Data

Procedures which governed the collection of data are described below.

1. A series of twelve slides and an accompanying written description were selected from the John Day Urban Education Studies.[11] Slides were drawn from two albums entitled Detroit Is and San Francisco Is, both of which presented interdisciplinary materials appropriate for use with elementary children.

Students in the Elementary Education Methods Block at Michigan State University enrolled during Winter Term, 1969, served as the population. These students were asked to identify major social science ideas which could be taught to elementary pupils and to construct discussion questions they might pose to children in using this audio-visual material.

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[10] Michigan State University Catalog (East Lansing, Michigan: Michigan State University Publication, Vol. 63, No. 2, July, 1968), p. 134.

[11] Betty Atwell Wright, Urban Education Studies (New York: The John Day Company, 1967).

2. In addition the students responded to a cognitive complexity scale developed by Robert Zajonc.[12] This information was used to determine if a relationship existed between complexity as measured by this scale and previous amount of social science courses taken.

3. These twelve slides and accompanying descriptions were analyzed by a jury of four social science educators who determined the possible range of social science generalizations they felt could be developed. A composite of their findings served as a guide in evaluating whether structural generalizations listed by the students were appropriate.

4. The criterion measure used in classifying the levels of questions constructed by the students in this study was an analysis chart developed as part of a Ford Foundation Grant at the University of Missouri at Kansas City entitled _Final Progress Report: The Teacher Education Project of the School of Education_.[13] This instrument was based upon Benjamin S. Bloom's _Taxonomy of Educational Objectives, Handbook I: Cognitive Domain_,[14] and had been successfully applied at the University of Missouri at Kansas City in research settings similar to this study.

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[12]Robert Zajonc, "The Process of Cognitive Tuning in Communication," _Journal of Abnormal and Social Psychology_, 61 (February, 1960), pp. 159-164.

[13]_Final Progress Report: The Teacher Education Project of the School of Education_ (Kansas City, Missouri: University of Missouri at Kansas City, Ford Foundation Project, 1967), pp. 232-237.

[14]Bloom.

5. Three raters with social science backgrounds scored the student responses. These raters had been trained for this task by analyzing one set of data that had been previously scored by the researcher. All three raters then scored five student programs independently. Once an inter-rater reliability was established, each rater then scored one-third of the remaining programs.

Analysis of Data

Both one-way analysis of variance tests and Pearson product-moment correlational techniques were used in testing the first three hypotheses. A test of the significance of a Pearson product-moment correlation was used as the basis of assessing the final two major working hypotheses.

Review of Related Literature

This section directed itself to the following concerns:

1. What advantage does knowledge of structural concepts and generalizations provide to the teacher of social studies, particularly as his instruction is related to cognitive skill development?

2. What agreement exists between social science educators' present attempts to articulate the structure of the social science disciplines having most relevance to the social studies?

Advantages of Structural Knowledge

Michaelis,[15] Douglass,[16] Fenton,[17] and others have indicated that the central source of content for social studies instruction should be information selected from the accumulated knowledge of the social sciences. Bruner has emphasized the need for structural knowledge, pointing out the retentional advantages of such knowledge as well as the advantage of being able to make applications of this knowledge in other contexts. He stated that ". . . the curriculum of a subject should be determined by the most fundamental understanding that can be achieved of the underlying principles that give structure to that subject."[18]

Joyce further emphasized the need for structural knowledge.

> Scholarly knowledge has reached the point where factual knowledge of any field has become an impossibility even for the advanced scholar. More than ever before in the history of education, we need to devise a method of analysis which will enable us to sort out the truly important and organize it

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15John U. Michaelis, Social Studies for Children in a Democracy (4th ed.; Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 8.

16Malcolm P. Douglass, Social Studies From Theory to Practice in Elementary Education (Philadelphia: J. B. Lippincott Company, 1967), p. 10.

17Edwin Fenton, The New Social Studies (Chicago: Holt, Rinehart and Winston, Inc., 1967), p. 1.

18Jerome S. Bruner, The Process of Education (Cambridge, Massachusetts: Harvard University Press, 1961), pp. 31-32.

> in such a way that the relatively few things we are able to teach will have maximum educational effect.[19]

Recent emphasis on the important structural ideas has historical antecedents. Dewey[20] urged that logical arrangements of a discipline consist of an organization of the major ideas within that field.

Whitehead voiced essentially the concern mentioned above when he stated, "Let the main ideas which are introduced into a child's education be few and important, and let them be thrown into every combination possible . . . ."[21]

Joyce has summarized Bruner's hypotheses concerning the application of structure to education.

1. The major structural ideas of scholarly disciplines are essentially very simple.
2. These ideas can be developed in a form that even young children can discover (in childish terms, at first, and progressively in more sophisticated forms).
3. Structural ideas can be utilized as organizing themes in curriculums, being reiterated and rediscovered in more complex and adequate terms.
4. The child who is taught in such a way that he discovers the structural ideas in a discipline will be advantaged in that:
    a. Structure facilitates memeory (sic). Learning how things are related makes it easier to remember facts.
    b. Structure provides intellectual power by ensuring greater comprehension of the area concerned.

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[19]Bruce R. Joyce, "Content for Elementary Social Studies," Social Education, 28 (February, 1964), p. 84.

[20]John Dewey, Democracy in Education (New York: Macmillan Company, 1916).

[21]Alfred North Whitehead, The Aims of Education and Other Essays (New York: Macmillan Company, 1929), p. 3.

c. Structure facilitates transfer of learning to new situations and problems.
d. Structure is the language of the scholar. By learning structure the learner is brought closer to the leading edge of the discipline. He learns to think with the most advanced minds in the field.[22]

Teaching for Cognitive Skill Development

Taba has identified three categories of thought processes or cognitive tasks which must be developed to produce independence of thought. These are (1) concept formation, (2) interpretation of data and the making of inferences, and (3) the application of principles and facts to explain events or to build hypotheses through use of known generalizations or facts.[23]

Historically, two main schools of thought have emerged relative to the most effective means of developing learners capable of transferring abstract knowledge and skills into useful interpretations of their environment. The first has placed emphasis upon content, believing that a direct relationship existed between amount of knowledge of content retained and degree to which the learner was able to interpret his environment. The second emphasized that the use of knowledge in new situations was directly dependent on

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[22]Joyce, p. 85.

[23]John R. Verduin, Jr., Conceptual Models in Teacher Education: An Approach to Teaching and Learning (Washington, D. C.: The American Association of Colleges for Teacher Education, 1967), pp. 16-17.

how that knowledge was learned, i.e., that knowledge was acquired as it related to its utility to the learner.

Parker,[24] in reviewing the problem of teaching for transfer, has concluded that the matter of methodology is still an issue of concern to educators. He suggested that one resolution of this problem was to select content that possesses general applicability.

What cognitive skills are necessary, then, for teachers to successfully teach for social studies learnings which have general applicability? Hilda Taba, in articulating the teaching strategies developed under her direction as part of the Contra Costa Social Studies Curriculum Project,[25] pointed out that teachers must have two cognitive maps if they are to successfully develop cognitive skills. Teachers not only need to know the sequence of the process involved in learning but must also have structural understandings related to content.

> For example, in the task of enumerating and categorizing the differences one would expect to find in Latin America, the teacher needs to know what the important differences between the United States and Latin America are, in order to help students to an orderly conceptualization of these differences.[26]

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[24]Parker and Rubin, p. 13.

[25]For information about this program, see Hilda Taba and James J. Hill, Teacher Handbook for the Contra Costa Social Studies, Grades 1-6 (Haywood, California: Rapid Printers and Lithographers, 1965).

[26]Hilda Taba et al., Thinking in Elementary School Children (San Francisco State College, San Francisco, United States Office of Education Cooperative Research Program Project No. 1574, 1965), p. 52.

Do social science courses taken at the college level have a measurable effect upon a pre-service teacher's cognitive map related to structural generalizations? While the evidence is inconclusive, some opinion and tangentially related research findings were found.

Fenton[27] has stated that his experience would indicate that students do not gain structural knowledge from social science courses offered within the university. He indicated that social science courses offered to juniors and seniors often cover narrow specialties while survey courses taught to freshmen and sophomores often sweep huge fields of knowledge.

Recent studies concerned with transfer of learning seem to indicate that transfer to novel situations is facilitated only when previous learning placed emphasis upon discovery rather than expository teaching. Della-Piona, Eldredge, and Worthen[28] reviewed thirty-eight studies comparing expository versus generalization-discovery methods. While most of these studies were only remotely related to the research design used in this study, their conclusion that generalization-discovery methods were significantly superior in facilitating transfer in five out of six studies is noteworthy.

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[27]Fenton, p. 101.

[28]Gabriel M. Della-Piona, Garth M. Eldredge, and Blaine R. Worthen, Sequence Characteristics of Text Materials and Transfer of Learning (University of Utah, Salt Lake City, United States Office of Education Cooperative Research Program Project No. 2277, 1965).

In a well-controlled experiment Scardura[29] found that sixth grade students taught card problems by discovery methods performed significantly better than those taught by expository methods when the criterion problems to be solved were based on similar but not identical principles to those previously taught (called novel problems). In other words, subjects had to modify slightly their mode of attack. When the criterion measure required no modification (called routine problems), the two groups did not differ significantly. No attempt was made to control the time required to learn the task. The group taught by exposition required a mean of 108 minutes before testing while the discovery group needed a mean of 153 minutes.

When Scardura held the time constant for the groups, the expository group performed significantly better on routine problems on the criterion measure which required no modification of attack in arriving at a solution. The two groups did not differ on the criterion measure for modified problems, an important finding. In other words, while performance dropped off drastically for the expository group, subjects taught by the inductive method performed equally well on both measures.

Guthrie[30] taught seventy-two college seniors to decipher cryptograms with four instructional sequences

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[29]Scardura, pp. 149-157.

[30]John T. Guthrie, "Expository Instruction Versus a Discovery Method," Journal of Educational Psychology, Vol. 58, No. 1 (January, 1967), pp. 45-49.

(rule-example, example-rule, example, and rule). His conclusions were consistent with those of the Scardura studies cited above. The discovery method facilitated remote transfer while the expository method facilitated retention but hindered transfer requiring modification of a rule or principle.

Structural Learnings Relevant to This Study

Researchers have made few noteworthy attempts to build an exhaustive list of structural generalizations focusing upon salient aspects of social studies education. This researcher has selected structural generalizations which appear to be related to the John Day Urban Education Studies, the instrument which was used to collect the data.

Figure 1.1 illustrates that some agreement does exist relative to each of these generalizations. Inspection of this figure reveals that there was high agreement between those structural generalizations posited by the researcher and those identified by the four selected frameworks. In four of the ten structural learnings identified, for example, all sources were in essential agreement. In only two of the ten structural generalizations cited by the researcher did limited agreement exist. In both cases, only two of the four frameworks identified listed a related social science generalization.

FIGURE 1.1.--Comparison of Social Science Structural Generalizations and Concepts from Selected Frameworks

	Related Generalization	California[31]	Wisconsin[32]	Jarolimek[33]	Seminar Series[34]
History	Present events have historical antecedents	The past influences the present . . .	Human experience is continuous and interrelated	Affairs of human societies have historical antecedents	None directly related
	Historical change and historical progress	Change has been a universal condition of human society. Change and progress are not synonymous	Progress inevitably involves change, but changes do not always mean progress	Human societies are undergoing continual changes in response to various forces	Continuous change has been a universal condition of human society
Geography	Geographic factors influence how man adapts and utilizes the earth	None directly related	The natural conditions of the earth influence the way in which people live and work	Geographic factors influence where and how people live and what they do	Man's use of land is usually the result of both physical and cultural factors

FIGURE 1.1 (cont'd.)

	Related Generalization	California	Wisconsin	Jarolimek	Seminar Series
Geography	Areas of the world are geographically dependent	Political cooperation and strife between nations are related to their geographic locations	A human settlement is related to other places which supply it with goods and services	Areas of the world develop bonds, interconnections, and relations with other areas	The evolution of mankind to an interdependent whole means more trade, migration, and diffusion
Economics	Man is always faced with the problem of limited resources and unlimited wants	Productive resources are scarce, and human wants are unlimited	Man constantly tries to narrow the gap between limited resources and unlimited wants	The wants of man are unlimited, whereas resources man needs to fulfill his wants are scarce	All economic systems are confronted with the problem of relative scarcity
	Increased specialization in production has led to greater interdependence among people	None directly related	Specialization leads to interdependence which demands a market where buyers and sellers can meet	Increased specialization in production has led to interdependence among individuals, communities, states, and nations	In a complex economic system, individuals are dependent upon others for satisfaction of wants and needs

FIGURE 1.1 (cont'd.)

	Related Generalization	California	Wisconsin	Jarolimek	Seminar Series
Sociology-Anthropology	Increased transportation and communication have resulted in greater cultural diffusion	Modern, rapid transportation and communication make isolation unlikely in the future	Cultural change occurs continuously and at an accelerating rate	Increased contacts of persons from various cultures are resulting in greater cultural diffusion	None directly related
	Every society has its own system of beliefs and values . . . its culture	The world into which every individual must fit is defined by his culture	Human beings are in part a product of their culture	Every society has formed its own system of beliefs and values . . . its culture	Every society has regular patterns of behavior that make it possible to predict behavior
Political Science	One of the functions of government is to provide services which contribute to the general welfare of its people	The ultimate responsibilities of government include services essential to the general welfare	None directly related	The responsibilities of governments include services essential to general welfare	None directly related

FIGURE 1.1 (cont'd.)

	Related Generalization	California	Wisconsin	Jarolimek	Seminar Series
Political Science	Decisions and laws made by a government are based upon beliefs and values in that society	None directly related	None directly related	The decisions, policies, and laws for a given society reflect the values, beliefs, and traditions of that society	A society's political system is closely related to its system of values

[31]Social Studies Framework for the Public Schools, Part III (Sacramento, California, California State Department of Education, State Curriculum Commission, June, 1962), pp. 89-109.

[32]A Conceptual Framework for the Social Studies in Wisconsin Schools (Madison, Wisconsin, State Superintendent of Public Instruction, 1965).

[33]John Jarolimek, Social Studies in Elementary Education (3d ed.; New York: Macmillan Company, 1967), pp. 444-447.

[34]The following volumes of the Charles E. Merrill Social Science Seminar Series, ed. Raymond H. Muessig and Vincent R. Rogers (Columbus, Ohio: Charles E. Merrill Books, Inc., 1965), were used:

Henry Steele Commager, The Nature and the Study of History
Jan O. M. Broek, Geography: Its Scope and Spirit
Richard S. Martin and Reuben G. Miller, Economics and Its Significance
Caroline B. Rose, Sociology: The Study of Man in Society
Pertti J. Pelto, The Study of Anthropology
Francis J. Sorauf, Political Science: An Informal Overview

Conclusions

The following conclusions related to the design of this study were drawn from review of the literature.

1. Teaching for structural generalizations drawn from the social sciences is desirable, because such practice places emphasis upon meaningful relationships upon which facts can be selected for retention.

2. Teachers are conceptualized as needing two "cognitive maps" or two unique sets of understandings to successfully teach for transfer, i.e., they need to be aware of the processes of learning as well as to have knowledge of structural understandings related to content.

3. Since university social science courses are generally seen to place emphasis upon deductive modes of instruction, such practice should not facilitate transfer to the novel situations, i.e., to the criterion measures used in this study.

4. There is sufficient agreement on the major structural generalizations which appear to have relevance to the program selected for this study.

CHAPTER II

DESIGN OF STUDY

This chapter describes the design of the study. It elaborates the research design, describes specific procedures used in building and selecting the criterion measures and methods of collecting and analyzing the data, and discusses in more detail the population used for this study relative to certain demographic variables.

Research Design

Table 2.1 illustrates the variables relevant to this study. This matrix reveals the five relationships from which the researcher's major hypotheses were constructed.

TABLE 2.1.--Matrix of Independent and Dependent Variables

Independent Variables	Dependent Variables		
	Structural Generalizations	Levels of Questions	Cognitive Complexity
Social Science Coursework Experience	1	2	3
Cognitive Complexity	4	5	X

When more than one independent variable is used to predict relationships, as was the case in predicting

performance on identification of structural generalizations and on construction of high level questions, explanation should be explored through multi-variate models. Zetterberg has stressed the importance of considering all possible relationships between independent and dependent variables in attempting to predict possible causations. In comparing possible relationships between two independent variables and some dependent variable, Zetterberg listed thirteen possible relationships.[1] Of these, six multi-variate models were selected because of their relevance to this study.[2]

The following symbols were used in describing the models:

X = amount of social science experience

Y = level of cognitive complexity

Z_1 = number of structural generalizations identified

Z_2 = level of questions constructed

Multi-Variate Models

1. $X \leftrightarrow Z_1$ or $X \leftrightarrow Z_2$

In this model, a direct relationship exists between one independent variable (social science experience) and one of the dependent variables (structural generalizations

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[1]Hans L. Zetterberg, On Theory and Verification in Sociology (3d ed.; New York: The Bedminster Press, 1965), pp. 146-147.

[2]The writer is particularly indebted to Dr. Cleo H. Cherryholmes, Associate Professor of Political Science at Michigan State University, for his assistance in clarification of this design.

identified and/or levels of questions constructed), and neither is related to the other independent variable (level of complexity).

2. $Y \leftrightarrow Z_1$ or $Y \leftrightarrow Z_2$

In this model, a direct relationship exists between one independent variable (cognitive complexity) and one of the dependent variables (structural generalizations identified and/or levels of questions constructed), and neither is related to the other independent variable (social science experience).

3. $X \leftrightarrow Y$

In this model, a direct relationship exists between the two independent variables (social science experience and cognitive complexity) but both are unrelated to one of the dependent variables (structural generalizations identified and/or levels of questions constructed).

4. $\begin{tikzcd} X \arrow[r, leftrightarrow] \arrow[dr, leftrightarrow] & Y \\ & Z_1 \end{tikzcd}$ or $\begin{tikzcd} X \arrow[r, leftrightarrow] \arrow[dr, leftrightarrow] & Y \\ & Z_2 \end{tikzcd}$

In this model, a direct relationship exists between the independent variables, but only one of the independent variables (social science experience) is related to the dependent variable (structural generalizations identified and/or levels of questions constructed).

5. $\begin{tikzcd} X \arrow[r, leftrightarrow] & Y \\ Z_1 \arrow[ur, leftrightarrow] & \end{tikzcd}$ or $\begin{tikzcd} X \arrow[r, leftrightarrow] & Y \\ Z_2 \arrow[ur, leftrightarrow] & \end{tikzcd}$

In this model, a direct relationship exists between the independent variables, but only one independent variable (cognitive complexity) is related to the dependent variable (structural generalizations identified and/or levels of questions constructed).

6. $\begin{tikzcd}[column sep=small, row sep=small] X \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & Y \arrow[dl, leftrightarrow] \\ & Z_1 & \end{tikzcd}$ or $\begin{tikzcd}[column sep=small, row sep=small] X \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & Y \arrow[dl, leftrightarrow] \\ & Z_2 & \end{tikzcd}$

In this model, both independent variables are directly related to each other and are also directly related to the dependent variable.

Tests applied to the data were based upon these six models. Reference will be made in the following chapter to the models described here.

Procedures

There were three distinct procedures required in this design. The first was related to building or selecting criterion instruments and with related validation procedures. The second procedure was concerned with the collection of data; the third dealt with training of the raters and with establishing inter-rater reliability.

Instrumentation

Twelve slides and accompanying written narratives were selected from two albums of the John Day Urban Education Studies entitled Detroit Is and San Francisco Is. These slides and their written accompaniment were selected from fifty-seven slides included in these two albums on the basis of a related study conducted by the researcher and his doctoral committee chairman during Winter Term, 1968. Those slides which appeared to most clearly identify one or more social science structural generalization were selected.

Four social science educators were asked to view the twelve elements drawn from the John Day Urban Education Studies. Each element included one slide and an accompanying written narrative related to that slide. These educators were asked to list all of the social science structural generalizations they saw within each particular element.[3]

The researcher then analyzed the responses to determine whether or not essential agreement existed between the generalizations posited by each rater. The results of this analysis are shown in Table 2.2. This table reveals, for example, that with respect to the first slide-narrative element identified (Element One), four structural generalizations were identified independently while only one was identified by all of the raters.

An inspection of these results revealed that there was no essential agreement among the jurors with respect to Elements Five and Nine, and these two elements were subsequently not included in the final analysis. The criterion measure for identification of social science structural generalizations was then built.[4]

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[3]Three of the judges were elementary social science educators at Michigan State University having particularly strong backgrounds in geography, history, and sociology. They were Drs. William W. Joyce and Ruby M. Junge, Associate Professors of Education, and Dr. Janet Alleman, Assistant Professor of Education. The responses of Dr. Cleo H. Cherryholmes, Associate Professor of Political Science, were also used in building the criterion measure for generalization identification.

[4]The Criterion Measure for Structural Generalizations appears in Appendix A.

TABLE 2.2.--General Agreement Between Judges on Identification of Social Science Structural Generalizations

Element Number	Low Agreement: Structural Generalizations Separately Listed	Low Agreement: Structural Generalizations Listed by Two Judges	High Agreement: Structural Generalizations Listed by Three Judges	High Agreement: Structural Generalizations Listed by Four Judges
1	4	0	0	1
2	4	1	1	0
3	4	1	1	1
4	4	0	0	2
5	5	2	0	0
6	4	0	0	1
7	0	0	1	1
8	4	1	1	0
9	9	1	1	0
10	4	0	2	0
11	3	0	1	0
12	4	2	1	0

After studying other measures of cognitive skills based upon questioning, a measure of levels of questioning developed at the University of Missouri at Kansas City was selected.[5] This instrument had been used with a high degree of inter-rater reliability in research analysis related to teacher-based instructional questions.[6]

The measure of cognitive complexity used for this study was developed by Zajonc.[7] It represents one of several measures currently in use. This measure was used to discriminate those pre-service elementary education teachers whose concept of "urban education" reflected a high level of complexity from those whose level of complexity in response to the concept was low.

The complexity score obtained was a weighted sum of the number of attributes a student had in his concept of "urban education" (differentiation) and the number of distinct ways he could group those attributes (intergration). The number of attributes for each category was multiplied by the order in which that particular category was conceptualized. Table 2.3 illustrates how one hypothetical student's score was derived.

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[5]The Criterion Measure for Levels of Questioning appears in Appendix B.

[6]The researcher is particularly grateful to Dr. Mary Lee Marksberry for this instrument as well as for related material.

[7]Zajonc, pp. 159-164.

TABLE 2.3.--Computation of a Hypothetical Student's Cognitive Complexity Score

NAME________________________________ STUDENT NO.__________

	Category	Attributes	Computation of Score
1.	cities	Detroit Chicago New York	1 x 3 = 3
2.	ethnic groups	Puerto Rican Italian Mexican Negro	2 x 4 = 8
3.	urban population	overpopulated crowded poor underprivileged	3 x 4 - 12
4.	urban area	slum run-down renewal	4 x 3 = 12
5.	activities of groups	fights gangs	5 x 2 = 10
6.	view of school	useless wasted boring	6 x 3 = 18
		TOTAL	63

On February 3, 1969, thirty-four students were given the complexity measure. On March 7, 1969, the date of data collection from the entire population, twenty-one of the thirty-four subjects were present. These twenty-one subjects were again administered the complexity measure in an attempt to build a test-retest reliability measure. The results reflected the fact that this measure of complexity was fairly reliable over time ($r = .79$).

Data Collection

On March 7, 1969, 148 students were given the following measures:

1. First, students were given the complexity scale developed by Zajonc.[8]

2. Students were then asked to complete two informational sheets.[9] After this information had been collected, students were then taken through the first element of the program. They were told to first read the written description, then to view the slide which had been projected upon a clearly visible center screen. They were then asked to respond to the two questions related to that element.[10]

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[8]The set of directions given to the students in testing for complexity can be found in Appendix D.

[9]See the first two pages of Appendix C.

[10]The third page of Appendix C contains the written portion of Element One as well as the questions which were asked in reference to each slide.

Time was a factor as the subjects were limited to five minutes per element. In the researcher's opinion, however, this seemed to be ample time for nearly all students. Students were given an additional five minutes at the end to finish any responses for which they felt they needed more time.

Only 133 of the 148 sets of responses were eventually analyzed. Reasons for omitting fifteen sets of the program included: (1) an unusual major which was not readily categorized in the five divisions made by the writer, (2) insufficient information given upon which to categorize the student, (3) student declared that he was a social science major but had fewer than thirty hours in social science, (4) student declared he was not a social science major in elementary education but listed more than thirty hours in the social sciences.

Building Inter-Rater Reliability

The three raters hired to rate the student responses to structural generalizations and to levels of questions were all in social science education. Of the two who were in elementary social science education, one had her Ph.D. and the other was just completing it. The third was a doctoral student in secondary social studies education.

Raters were asked to go through one data set which the researcher had scored. This session was used to introduce the two criterion measures (Appendices A and B) to the raters as well as to openly and critically discuss the investigator's ratings. After the three raters and the investigator were in agreement on the initial data set, the raters were asked to independently score five new sets. The investigator had attempted to choose five sets of data which he felt would represent high, medium, and low performance on the two criterion measures.

Snedecor's formula for estimating reliability of ratings was used to measure inter-rater reliability. Ebel has suggested that this formula and other related formulas for interclass correlation are more convenient and generally useful than other methods of estimating reliability of ratings.[11] Tables 2.4 and 2.5 indicate how the inter-rater reliability coefficients were obtained using Snedecor's formula. The inter-rater reliability coefficients for social science structural generalizations and for levels of questioning were .88 and .78 respectively. Since these estimates were obtained upon measures which were not static, and since the remainder of the collection instruments were randomly assigned to the three raters, these estimates were viewed as satisfactory for the purposes of this study.

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[11]Robert L. Ebel, "Estimation of the Reliability of Ratings," Principles of Educational and Psychological Measurement, ed. William A. Mehrens and Robert L. Ebel (Chicago: Rand McNally and Co., 1968), pp. 120-121.

TABLE 2.4.--Inter-Rater Reliability for Social Science Structural Generalizations

Program Set	Rater One	Rater Two	Rater Three
One	6	6	7
Two	6	7	7
Three	7	7	8
Four	9	10	10
Five	2	4	2

Sum of squared ratings = 722
Product of sum and mean = 639.9
Sum of squares for
raters = 2.5
pupils = 76.8
total = 82.1
error = 2.8
Mean square
pupils = 19.2
error = .7
Reliability of ratings = .88

TABLE 2.5.--Inter-Rater Reliability for Levels of Questions

Program Set	Rater One	Rater Two	Rater Three
One	15	16	21
Two	10	9	11
Three	11	10	13
Four	13	15	19
Five	15	16	19

Sum of squared ratings = 3,211
Product of sum and mean = 3,024.6
Sum of squares for
raters = 43.6
pupils = 131.7
total = 186.4
error = 11.1
Mean square
pupils = 32.9
error = 2.8
Reliability of ratings = .78

The remaining 128 data sets were then randomly divided among the three raters. The results of these ratings were then recorded along with the results on the complexity scale which the investigator tabulated.

Population Variables

Since much of the analysis in Chapter III was based upon arrangement of students on the basis of their major outside of elementary education, the following demographic variables are reported on that basis. The variables reported here are age, sex, and all-college grade point average.

Age

The first demographic variable selected for comparison was age differential among groups. An inspection of Table 2.6 revealed that there were no significant differences with respect to mean age.

TABLE 2.6.--Mean Age of Majors

Major	Mean Age
Social Science	21.5 years
Mathematics-Science	21.3 years
English	22.6 years
Fine Arts	21.8 years
Special Education	20.2 years

Male-Female Composition

The male-female ratio for the respective majors follows. The total number of males here was insignificant.

TABLE 2.7.--Male-Female Ratio by Major

Major	Males	Females
Social Science	5	26
Mathematics-Science	1	27
English	3	19
Fine Arts	2	19
Special Education	1	30

Grade Point Average

The population groups were compared on the basis of grade point average. An inspection of the results in Table 2.8 revealed no striking differences.

TABLE 2.8.--Mean Grade Point Average of Majors

Major	Mean Grade Point Average
Social Science	2.6
Mathematics-Science	2.7
English	2.5
Fine Arts	2.7
Special Education	2.6

Summary

This chapter elaborated the research design which was applied in analyzing the data in Chapter III. Emphasis was placed on a design articulated by Hans Zetterberg. The procedures related to instrumentation and methods of collecting and analyzing the data were then described.

Finally, students were categorized on the basis of majors outside of elementary education and compared on the basis of age, sex, and grade point average. No significant differences on the basis of these demographic variables were readily seen.

CHAPTER III

ANALYSIS OF DATA

This chapter reports the results of the five major working hypotheses under investigation. It also explores relationships between the findings and the multi-variate models described in Chapter II. Finally, a summary of those results can be found at the end of this chapter.

Testing the Hypotheses

All five major working hypotheses were stated in the null form; the lack of previous research data precluded the use of directional hypotheses. Alpha levels were set at the .05 level of significance. The investigator has followed the convention of Hill and Kerber of never accepting a null hypothesis. They stated:

> The null hypothesis (H_0) is an "empty" or "void" statement of "no difference" advanced with the hope that the data of the sample will reject it . . . . Thus, the null can never be accepted.[1]

Hypothesis I

> ${H_0}_1$ Students varying in social science background will not differ in the ability to identify social science structural generalizations.

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[1]Joseph E. Hill and August Kerber, Models, Methods and Analytical Procedures in Education Research (Detroit: Wayne State University Press, 1967), p. 298.

This hypothesis was tested in two ways. First, it was hypothesized that no direct relationship would exist between the number of social science quarter-hours taken and the number of structural generalizations identified (α = .05). A Pearson product-moment correlation between these two variables was computed, and a test for the significance of r was then applied.

TABLE 3.1.--Correlation Between Number of Social Science Quarter-Hours Taken and Performance in Identification of Social Science Structural Generalizations

Correlation Between Variables	F Value	Significance Probability of F Value
0.04963	0.32344	0.571

The researcher was not able to reject the null hypothesis which predicted that no relationship would exist between number of social science quarter-hours taken and performance in identification of social science structural generalizations at the .05 level.

The second method of determining whether a relationship existed between social science experience and generalization identification was carried out by classifying students according to their major outside of elementary education. This ancillary hypothesis predicted that majors in social science would not perform differently than majors in mathematics-science, English, fine arts, and special education. A one-way analysis of variance test for unequal n was used to treat this data.

TABLE 3.2.--One-Way Analysis of Variance Test Results Comparing Five Majors (Social Science, Mathematics-Science, English, Fine Arts, Special Education) in Ability to Identify Structural Generalizations

Source of Variance	SS	df	MS	F	Probability of Significance
Between	60.402	4	15.100	2.081	0.087
Within	928.410	128	7.253		
Total	988.812	132			

While the null hypothesis predicting no relationship between major and identification of structural generalizations could not be rejected at $\alpha = .05$, the results did approach significance (.087). In Chapter IV the researcher will attempt to explain why no relationship was found between number of social science quarter-hours taken and identification of generalizations when type of major did approach significance. The investigator has, therefore, included the following relevant data in Table 3.3.

TABLE 3.3.--Major, Size of Group, and Mean Score of Group in Identification of Structural Generalizations

Major	N	Mean Structural Generalization Score
Social Science	31	5.677
Mathematics-Science	28	5.392
English	22	3.955
Fine Arts	21	4.095
Special Education	31	5.161

Hypothesis II

H_{o_2} Students varying in social science background will not differ in the ability to construct high level questions.

This hypothesis was also tested in two ways, i.e., a Pearson product-moment correlation was computed to determine whether a direct relationship existed between number of quarter-hours of social science taken and levels of questions constructed; and a one-way analysis of variance test for unequal numbers was run to compare groups on the basis of major outside of elementary education with respect to this dependent variable (α = .05). Tables 3.4 and 3.5 describe the results.

TABLE 3.4.--Correlation Between Number of Social Science Quarter-Hours Taken and Performance on Levels of Questioning

Correlation Between Variables	F Value	Significance Probabilities of F Value
0.01336	0.02339	0.879

TABLE 3.5.--One-Way Analysis of Variance Test Results Comparing Five Majors (Social Science, Mathematics-Science, English, Fine Arts, Special Education) in Ability to Construct High Level Questions

Source of Variance	SS	df	MS	F	Probability of Significance
Between	45.844	4	11.461	1.016	0.401
Within	1443.314	128	11.276		
Total	1489.158	132			

An inspection of Tables 3.4 and 3.5 revealed that the null hypothesis predicting no relationship between social science experience and levels of questioning could not be rejected at the .05 level on the basis of either number of social science quarter-hours taken or major outside of elementary education.

Hypothesis III

> H_{o_3} Students varying in social science background will not differ in performance on a cognitive complexity scale.

As in the analysis of the first two major hypotheses, the third hypothesis was analyzed in two distinct ways. First, it was hypothesized that no relationship would exist between number of social science quarter-hours taken and level of cognitive complexity (α = .05). Table 3.6 contains the derived correlation between these two variables as well as the probabilities of a significant r.

TABLE 3.6.--Correlation Between Number of Social Science Quarter-Hours Taken and Level of Complexity

Correlation Between Variables	F Value	Significance Probabilities of F Value
0.05198	0.35484	0.552

The researcher was unable to reject the null hypothesis which predicted that no relationship would exist between number of social science quarter-hours taken and level of complexity at the .05 level of significance.

Students were again compared on the basis of their major outside of elementary education to determine whether a relationship existed between their major and level of complexity. A one-way analysis of variance for unequal numbers was run. Table 3.7 reports the findings (α = .05).

TABLE 3.7.--One-Way Analysis of Variance Test Results Comparing Five Majors (Social Science, Mathematics-Science, English, Fine Arts, Special Education) in Level of Cognitive Complexity

Source of Variance	SS	df	MS	F	Probability of Significance
Between	11030.548	4	2757.637	2.172	0.076
Within	161394.383	128	1269.487		
Total	173524.931	132			

While the researcher could not reject the null hypothesis predicting that no relationship would exist between major and level of complexity at the .05 level, the results did approach significance (.076). Since these results warranted further analysis, the following data were included in Table 3.8.

TABLE 3.8.--Major, Size of Group, and Mean Score of Each Group on Level of Complexity Scale

Major	N	Mean of Complexity Scale Score
Social Science	31	53.194
Mathematics-Science	28	73.643
English	22	48.455
Fine Arts	21	49.381
Special Education	31	57.097

Hypothesis IV

H_{o_4} There will be no relationship between level of complexity and number of social science structural generalizations identified.

A correlation between these two variables was run. The results follow.

TABLE 3.9.--Correlation Between Level of Complexity and Performance in Identification of Social Science Structural Generalizations

Correlation Between Variables	F Value	Significance Probabilities of F Value
.05505	.39821	.529

The null hypothesis predicting that no relationship would exist between level of cognitive complexity and number of structural generalizations identified could not be rejected at the .05 level of significance.

Hypothesis V

H_{o_5} There will be no relationship between level of complexity and levels of questions constructed.

The correlation between these two variables and the probability of significance were as follows.

TABLE 3.10.--Correlation Between Level of Complexity and Performance on Levels of Questions Constructed

Correlation Between Variables	F Value	Significance Probabilities of F Value
.00004	.00000	1.000

The null hypothesis predicting that no relationship would exist between level of complexity and levels of questions constructed could not be rejected at the .05 level of significance.

Relationship to Multi-Variate Models

It should be clear to the reader that when the number of social science quarter-hours taken was used as the independent variable representing previous social science experience, no correlation existed between any of the independent and dependent variables. Clearly, no relationship could be seen to exist which would indicate that previous social science coursework influences a student's ability to either identify structural generalizations or to write high level questions.

When previous social science experience was viewed as having a major in social science and when categories were then set up on the basis of major outside of elementary education, an intriguing relationship could be seen. Model four described in Chapter II was used here to illustrate this relationship.

FIGURE 3.1.--Multi-Variate Model Describing Possible Causative Relationship Between Three Variables

$$\begin{tikzcd} X \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & Y \\ & Z_1 & \end{tikzcd}$$

Where:

X = major outside of elementary education
Y = level of cognitive complexity
Z_1 = number of social science structural generalizations correctly identified

The relationships depicted in Figure 3.1 were as follows:

1. Majors in elementary education social science and elementary education mathematics-science tended to identify more structural generalizations than did elementary education majors with academic majors in English and fine arts.

2. Majors in elementary education with an emphasis in mathematics-science were found to be more cognitively complex than were other emphasis majors even though the complexity scale was based upon a term having most relevance to social science.

Summary

The researcher was unable to reject any of the null hypotheses which predicted that previous social science experience would not influence a prospective elementary education teacher's ability to identify structural generalizations and to write more high level questions. Clearly, social science coursework could not be seen within the context of this study to have any affect upon the ability to either induce social science structural generalizations or to construct high order questions.

Students with a social science background, instead of being shown to be better able to conceptualize on one measure of cognitive complexity, were shown to be somewhat less able to conceptualize (at the .076 level of significance) than were students with a predominantly mathematics-science background. This finding supports the contention that mathematics-science majors tend to have greater general intelligence than other academic majors.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the purpose, methodology, and findings of the study and reveals conclusions and recommendations for further research.

Summary of the Study

The purpose of this study was to determine whether there was a relationship between the amount of university social science coursework a student had taken prior to his entrance into an elementary social studies methods course and the student's ability to (1) identify social science structural generalizations and (2) construct hypothetical teaching questions related to these generalizations. If a relationship could be shown to exist between previous coursework and performance in identification of structural generalizations and/or performance in constructing high level questions, this study then sought to determine whether such results were, in part, due to a second independent variable, namely, level of cognitive complexity.

Recent studies on transfer of learning indicated that transfer to novel situations was facilitated _only_ when prior learning had been accomplished through inductive rather than

expository teaching methods (Scardura[1] and Guthrie[2]). Accordingly, null hypotheses were developed in an attempt to determine the effects of social science background upon the generalizing process. This was done for two reasons. (1) Most social science educators seem to agree that social science courses are generally taught by deductive rather than inductive methods of instruction, and (2) the criterion measures related to structural generalizations and to levels of questions were novel situations requiring discovery by the students in this study.

One hundred thirty-three undergraduate students taking a social studies methods course in elementary education at Michigan State University served as the population. All students were asked to view twelve slides and accompanying written descriptions from a social science oriented program designed to teach elementary school children concepts and generalizations related to urban education. Students were then asked to identify in each element one major social science generalization which they might attempt to teach to children. They were also asked to write one important question they might pose to children in developing that idea. A panel of social science educators had previously

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[1]J. M. Scardura, "An Analysis of Exposition and Discovery Modes of Problem Solving Instruction," The Journal of Experimental Education, XXXVII (Winter, 1964), pp. 149-157.

[2]John T. Guthrie, "Expository Instruction Versus a Discovery Method," Journal of Educational Psychology, Vol. 58, No. 1 (January, 1967), pp. 45-49.

viewed the program, and a criterion measure based upon those elements which most clearly illustrated structural learnings had been built. A measure of cognitive complexity developed by Robert Zajonc[3] was also given to the students.

The data were then analyzed by three raters. Inter-rater reliability estimates obtained for generalization identification and for levels of questions constructed were .88 and .78 respectively. These reliability estimates were seen as satisfactory for the purposes of this study since they were obtained on measures which were not static and because the remainder of the collection instruments were randomly assigned to the three raters.

Findings

When social science experience was defined on the basis of number of university social science credits taken, no relationship was found to exist regarding the dependent variables (number of structural generalizations identified, levels of questions constructed, or level of cognitive complexity). Further, no relationship existed between level of cognitive complexity and either identification of structural generalizations or levels of questions constructed.

When social science experience was determined on the basis of the pre-service teacher's major outside of elementary education, two relationships, though not significant at

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[3]Robert Zajonc, "The Process of Cognitive Tuning in Communication," Journal of Abnormal and Social Psychology, 61 (February, 1960), pp. 159-164.

the $\alpha = .05$ level, emerged. First, students specializing in elementary education social science and mathematics-science identified more structural generalizations drawn from the social sciences than did majors in elementary education English and fine arts (significance of F = .087).

Secondly, majors in elementary education mathematics-science were better able to deal with a measure of cognitive complexity than were other emphasis majors <u>even though</u> the complexity scale was based upon a concept having most relevance to social science (significance of F = .076).

Discussion of Findings

Often, time and resources available to researchers preclude the use of extensive, tightly controlled procedures for collection and analysis of data. These factors often present potential sources of contamination and limit the generalizability of the findings. However, the fact that this study had no precedent and is, therefore, an initial exploratory undertaking partially compensates for any weaknesses in experimental design and statistical procedures. Specifically, the following limitations appeared to impinge upon the results of this study:

1. Two methods of measuring a student's ability to transfer his abstract knowledge to a novel situation were used in the study. Construct validity was difficult to control since, according to Campbell and Fiske, one

requirement of such validity requires that independent measures be constructed which reflect highly intercorrelated results.[4]

2. The population sample was drawn from one specific class in a given institutional setting. This study would need to be replicated at other universities and colleges and/or within other population samples at Michigan State University to determine whether previous social science coursework influences a student's ability to identify structural generalizations drawn from the social sciences.

This study, within the context of its limitations, supported the contention that previous social science courses are largely ineffectual in influencing a student's ability to inductively identify structural social science learnings drawn from some social science oriented material. The findings are consistent with some of the recent studies reviewed in Chapter I on cognition which have tentatively indicated that one's ability to discover relationships is directly related to being taught primarily by inductive modes of instruction.

Secondly, the finding that a student's ability to conceptualize was not related to his ability to identify structural generalizations raises serious questions about the construct validity of cognitive complexity measures. A

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[4]Donald T. Campbell and Donald W. Fiske, "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix," Psychological Bulletin, 56 (March, 1959), pp. 82-83.

perusal of related research indicated that there is little evidence to support the validity of cognitive complexity measures. Several types of measures have been devised but they lack both inter-reliability as well as reliability with related established aptitude measures.[5]

Another conclusion tentatively drawn from the findings of this study was that one or more independent variables not controlled in this design affected the subjects' performance on the structural generalization measure. The question of why students with a background in either mathematics-science or social science tended to identify more structural generalizations than did students with a background in English or fine arts is very difficult to answer since this study attempted to determine whether that relationship was due to previous social science course-work or level of cognitive complexity. Further research is clearly needed here to explore other possible causative factors. One possible cause may be inherent in the different orientations of the four academic majors. Since the fields of social sciences, mathematics, and science (natural or physical) have a greater problem-solving orientation than

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[5]For a report of attempts to validate complexity measures, see:

Joseph S. Vannoy, "Generality of Cognitive Complexity-Simplicity as a Personality Construct," Journal of Personality and Social Psychology, 2 (September, 1965), pp. 385-396, and

Siegfried Streufert and Michael Driver, "Impression Formation as a Measure of the Complexity of Conceptual Structure," Education and Psychological Measurement, 27, No. 4 (Winter, 1967), pp. 1025-1039.

English and the fine arts, this difference in orientation is posited as one possible explanation.

Another possible explanation of these results may reside in the similar reading skills necessary for interpretation in science and social studies. Shores, in a study of the reading proficiency of ninth grade students, found a high correlation between ability to read and interpret science material and ability to read and interpret historically oriented materials. He concluded that "Certain reading skills are significantly related to the ability to read history and science materials in a manner not explained by ability to read literature."[6]

Finally, the findings suggest that mathematics-science majors were more proficient in conceptualizing at higher levels of abstraction than other majors with respect to the scale used in this study (significance of $F = .076$). This finding was somewhat surprising when one considers that the results were based upon the students' responses to social science concepts, and could serve as an avenue of future research.

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[6]J. Harlan Shores, "Skills Related to the Ability to Read History and Science," Teaching Reading: Selected Materials, ed. Walter B. Barbe (New York: Oxford University Press, 1965), p. 329.

Implications for Social Studies Teacher Preparatory Programs

This study possesses several implications regarding elementary social studies teacher preparatory programs. These are described below.

1. College instructors of social studies methods courses should utilize a variety of inductive teaching strategies related to structural generalizations drawn from the social sciences if they wish to facilitate remote transfer of these understandings, i.e., transfer to situations in which the pre-service teacher must select and utilize social science oriented materials.

2. Emphasis upon behaviorally-based social studies instruction should include within its program some provision for building modules which specifically describe elements of both substantive knowledge in the form of structural generalizations and the cognitive processes inherent in teaching those structural learnings. One method of establishing entering and/or terminal behavior relative to the above would be to first select and validate a measure based upon social science oriented programs, media-packages, artifact kits, etc. This instrument could then be used as a pre-test to diagnose student needs or as a post-test to measure growth. For example, students might be asked to identify the selected salient generalizations embodied in some social science oriented material as well as to construct, possibly via the use of key questions, strategies for teaching these ideas to children.

3. The third implication was drawn from information collected beyond the scope of the original study. Limited data reported below suggests that truly interdisciplinary social science majors may perform better in identification of structural generalizations than students with a major primarily in one social science discipline. Table 4.1 reports the information collected relative to the above implication.

TABLE 4.1.--Performance of Students Based Upon Whether Previous Social Science Coursework had been Primarily Single or Multi-Disciplinary

Major	N	Mean Number of Quarter-Hours	Mean Score of Generalization Identification
Single Disciplinary*			
History	4	15.3	6.0
Sociology	2	13.0	3.0
Geography	3	16.3	4.7
Political Science	2	14.0	4.5
Economics	1	54.0	3.0
Multi-Disciplinary**	21	18.5	6.4

*Single Disciplinary - At least twelve hours in one social science discipline and coursework in no more than one other social science discipline. (Also includes twelve quarter-hours of general social science coursework required of all Michigan State University students.)

**Multi-Disciplinary - Coursework in at least four social science disciplines but with no more than nine hours in any one discipline. (Also includes twelve quarter-hours of general social science coursework required of all Michigan State University students.)

While the need for more definitive research in this area is clearly evident, some indication here would favor counseling pre-service teachers to take social science courses from several disciplines rather than having them specialize in only one discipline.

Recommendations for Further Research

This study constituted an exploratory examination of the effects of previous university social science experience upon a pre-service elementary education teacher's ability to use two important cognitive skills, i.e., to identify an important structural generalization inherent in social science related material and to construct a high level question geared to teach that generalization to children. During the course of this study, a number of modifications to the present design of the study plus other related avenues of research were uncovered by the researcher. A written description of each implication follows. Research hypotheses are also presented for those implications clearly evidencing possible directions for future experimental or quasi-experimental research.

1. Future investigators should build instruments related to identification of structural generalizations. These instruments are of vital importance, since measurement of the ability to recognize the potential utility of social science related information could serve as a guide in diagnosing learning problems as well as evaluating related student achievement. Validation and reliability studies related to these instruments would be worthy endeavors.

2. Studies are needed to determine whether a direct relationship exists between ability to identify social science structural generalizations and the nature of a student's social science background. Some data collected by this investigator seem to suggest that students with a varied social science background are better able to identify such generalizations when the collection instrument is multi-disciplinary in nature.

> H_Δ Students with an interdisciplinary social science background will differ from students with a single social science disciplinary background in ability to identify social science structural generalizations when the performance measure is interdisciplinary in nature.

3. Efforts are needed to build a hierarchy of social science generalizations. An extensive study utilizing this researcher's collection techniques could, through use of a key word or phrase computer retrieval system, collect possible combinations of generalizations.[7] This list could then be given to a panel of social science jurors who would rank all responses from most simple to most complex.

4. Further research is needed to determine the extent to which a student's academic major does influence his ability to identify social science structural generalizations.

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[7]For example, the third generation of John F. Vinsonhaler's Basic Information Retrieval System (BIRS) developed at Michigan State University would be eminently useful in this regard. Other information retrieval systems are under development by private industry and by major colleges and universities throughout the nation.

Attention should be focused upon a more precise dimension of analysis. If problem solving ability is a significant variable, some attempt to find or develop an instrument to measure this trait is required.

> H_{Δ} Social science and mathematics-science majors will differ in ability to identify social science structural generalizations.

> H_{Δ} Social science and mathematics-science majors will differ in ability to identify structural generalizations drawn from mathematics and science materials.

> H_{Δ} Social science and mathematics-science majors will differ in performance on a given measure of problem solving ability.

5. Future attempts to measure ability to construct high level questions in the type of situation described within this study will need to provide more specific information to the subject relative to specific objectives of the teaching materials he has been given, the grade level of students to which this material is to be taught, and a generalized description of the related learnings which have preceded this immediate teaching situation.

> H_{Δ} Previous social science experience will influence the ability of a student to construct high level social studies questions when the teaching situation clearly meets the conditions necessary for posing such questions.

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APPENDICES

APPENDIX A

COLLECTION INSTRUMENT FOR GENERAL BACKGROUND INFORMATION, SOCIAL SCIENCE STRUCTURAL CONCEPTS AND GENERALIZATIONS IDENTIFIED, AND RELATED QUESTIONS CONSTRUCTED

Please do not write in this space				
1	2	3	4	5
6	7	8	9	10
Complexity Score ______				
Concepts ______				
Questions ______				

BACKGROUND INFORMATION

NAME ______________________ STUDENT NO. ________
(Last) (First)

All College G.P.A. ________

Age ______

Academic Major (Please Check)

Social Science	_____	Physical Education	_____
Humanities	_____	Physical Science	_____
Art or Music	_____	Mathematics	_____
Natural Science	_____	Other (please specify)	_____
		______________	

Coursework taken in Social Sciences

No. of Hours	G.P.A.	
_____	_____	Social Science General (Soc Sci 231, 232, etc.)
_____	_____	Sociology
_____	_____	Anthropology
_____	_____	Geography
_____	_____	History
_____	_____	Political Science
_____	_____	Economics

Type of Community in which you were raised (If more than one type, indicate the number of years next to the respective type.)

______________	Large City (Detroit, Chicago, etc.)
______________	Suburb adjacent to large city
______________	Medium-sized city (Lansing, Flint)
______________	Small City (less than 50,000)
______________	Rural Area

Background information - Page 2

Name ______________________ Student No. ____________

Do you plan to do graduate work in social science and/or education? ______________

List organizations to which you have or presently belong (Scouts, frat. organizations, church, political)

____

____

____

____

List the grade level you expect to teach

____

Have you ever worked with children from an inner city school district (teaching, assisting, recreation, social work, scout leader, etc.)? __________ Yes __________ No

If so, please explain. ______________________________

____

____

____

Type of community in which you plan to teach

______________ Large City
______________ Suburb
______________ Medium City
______________ Small City
______________ Rural Area
______________ Outside the United States (please specify) ______________________________

____

____

(DETROIT IS - Slides 1-6)

ELEMENT ONE -

Dynamic . . . Cadillac's Village, or Fort Ponchartrain d'Etroit, is depicted as it must have appeared about 1705-10. Founded in a wilderness as a military key to the Great Lakes and the entire interior region, Fort Ponchartrain d'Etroit survived two Indian sieges, repeated epidemics, and once it was burned to the ground. The complete devastation (1805) gave Judge Woodward an opportunity to plan a new city which he foresaw was to be a metropolis. His grand design was later modified but the ruined fragment which remains gives Detroit a more interesting plan than any American city except Washington.

Detroit and commerce are practically synonymous. First it was the fur trade, then shipping, then lumber, iron and copper. Manufacturing became prominent after the Civil War. Major industries were based on the production of stoves, engines (steam), locomotives, bridges, shoes, copper and brass, carriages, paint and varnish, and pharmaceuticals. Between 1910 and 1920 Detroit's population nearly doubled, reaching almost a million. People came in increasing tempo through the next decade from all parts of the United States and from every nation under the sun. During the First World War Detroit produced an endless stream of airplanes, engines, trucks, tanks, guns and shells. This was repeated in World War II until Detroit became known as the Arsenal of Democracy.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT TWO -

A world seaport . . . All day and night the Detroit River is busy with boats. Only for a few weeks when ice blocks the river do the boats stop running. Each year since the St. Lawrence Seaway opened, the number of foreign vessels has increased. Forty-one overseas shipping lines are served by the Port of Detroit. As a result, the Detroit River handles about one hundred million tons of traffic a year, making it the world's busiest inland waterway. Most of the tonnage, however, is iron ore, coal, limestone, lumber, grain and petroleum products.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT THREE -

The city that Henry Ford made famous . . . Detroit cannot claim to be the birthplace of the automobile but in 1896 the first automobiles ever developed or seen in Detroit were driven by Charles B. King on March 6 and by Henry Ford on June 4. King's was a four-cylinder, four cycle, water cooled engine designed and built by himself. Ford's was a two-cylinder, four horsepower "Quadricycle," as he called it. He went through seven years of experimentation, disappointment, and failure before the Ford Motor Company and success arrived together in 1903. The idealized picture was recreated to show Henry Ford pushing his tiny car from the coal shed in the rear of his home on Bagley Avenue, in the heart of what is now downtown Detroit, in 1896.

Today Ford Motor Company's giant Rouge River Manufacturing plant is the largest concentration of closely knit factories in the United States. The Rouge is the only plant where iron ore, limestone and coal are unloaded on the docks, smelted into iron, converted into steel, and, within a matter of days, transformed into engines, frames, bodies and parts and finally, completed automobiles. The Rouge plant has its own fleet of ships, 100 miles of railroad, its own coke ovens, glass plant and paper mill. The parking lot holds 22,000 cars for 63,000 employees.

Though gas buggies were built elsewhere, it was Henry Ford who fought and broke the crippling Selden patent. He pioneered assembly line techniques, and produced cars within the means of multitudes. Then, by a revolutionary new minimum wage scale and shorter working day, he made Detroit the mecca of skilled mechanics the world over.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT FOUR -

The spawning ground of mass production and automation . . . The miracle of the assembly line, mass production and their brainchild, automation, all began in the great automobile plants of Detroit. Today, in addition to its world leadership in motor vehicles and parts, Detroit is first in the production of machine tool accessories, stampings, hardware and inductrial inorganic chemicals.

The original production assembly line was devised in the old Highland Park plant of the Ford Motor Company. Today by a process of quality control, interchangeability of parts, synchronization of production lines and simplification of the job of individual workmen, the efficiency of the operation results in greater quality and quantity of production as a lower price to the ultimate consumer.

Today, relatively few cars are actually produced in Detroit but Detroit engineering makes possible efficient assembly lines in Ohio, New Jersey, Missouri, Texas and California. Mass production techniques have been applied to most manufacturing processes in other industries. What was once an innovation has now become an accepted and standard hallmark of modern industry.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT FIVE -

Continually rebuilding itself . . . A long range master plan, growing out of a decade of study, guides the city in rebuilding itself. More than a thousand acres have been cleared for urban renewal. In the downtown area a dozen buildings of skyscraper proportions present an imposing facade.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT SIX -

Where people from many lands treasure their traditions . . . Like all great cities Detroit's population is made up of in-migrants. During the past century Detroit has typified the American urban melting pot. Most of these people are now second or third generations removed from their homelands elsewhere but their old-world traditions and customs given them identify and provide a cultural fusion which made freedom and democracy meaningful. Some of the largest nationality groups are the Poles, the Hungarians, the Italians, the Greeks, the Romanians and Ukranian groups. Negro Americans make up nearly one-third of the population of Detroit.

The International Institute, located in the Cultural Center of Detroit is a meeting place for people of many varied backgrounds. Its educational program is especially helpful to newcomers who cannot speak English or have an inadequate knowledge of the language. Folk dancing, Foreign Food Luncheons, Holiday fetes, childrens' programs and recognitions for new citizens are just part of the many activities which provide everyone with a chance to take part in and become part of the changing American culture. Forty show cases vividly represent the cultural contributions of the many immigrant people who have found friendship in Detroit.

The amalgamation of races and nationalities has also made it the testing ground of Democracy itself. It is still blending and refining diverse talents, skills and cultures to retain its pioneer role in a technical age devoted to research and development.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

(SAN FRANCISCO IS - Slides 7-12)

ELEMENT SEVEN -

Known for its cable cars . . . Here a cable car gripman, intent on the steep slope below, pulls on his grip lever, at the same time clanging his individual tune on the bell, to warn cabs, cars, and pedestrians that "We're coming down." The first cable car line (1873) was built by Andrew Hallidie, a Scottish immigrant, who saw the dangers of the horse drawn cars when the horses slipped on the steep foggy pavements. He invented a cable grip strong enough to pull a car with a load of passengers. By 1890 the city was covered with a network of cable car lines in addition to some 25 miles of remaining horse car lines in the more level areas. Within a few years there were cable railways in many of the large cities of the world, but now San Francisco is the only city where they are still in operation. They are a practical form of transportation as well as a favorite tradition in a city which values tradition.

The cable, which runs inside a slot in the street, is kept continuously moving by motors out in the car barn. The car moves with the cable whenever the gripman tugs back on his great lever, which tightens the grip reaching through the bottom of the car and down into the slot. When he releases his lever, the grip relaxes, letting the cable slide on through. He stops his car with one of his four types of brake and holds it on the hill, while some passengers hop off and others jump on.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT EIGHT -

The home of many oriental Americans . . . The Chinatown area of the city is the largest Chinese community outside the Orient, even though large numbers of younger Chinese families live in other parts of the city and the Bay Area. Chinatown is filled with shops---grocery stores carrying special foods for the residents, and curio stores for the tourists---but primarily it is still a residential area. Its restaurants cater as much to Chinatown residents as to visitors. The nearby public school and playground post their notices in both Chinese and English, and children of Chinese descent often attend Chinese school at the end of their regular school day.

Chinese immigrants, many of them from a famine area, began to arrive in San Francisco during the Gold Rush. In the 1860's thousands of workers were brought from China to help with laying the Union Pacific Railroad.

While property in Chinatown is very expensive and many of the restaurants are quite elegant, the conditions in the living quarters over the stores are poor and extremely crowded. This is compounded by the recent influx of refugees from Hong Kong, who move in with relatives, and join the workers in the sweat shops beneath the stores. Chinatown is one of the four target poverty areas of the city being given assistance under the Economic Opportunity Act. The crime and delinquency rate is lower here than in any other comparable area of the city.

The Japanese-American community, rudely uprooted at the beginning of World War II, has with difficulty become re-established. Many of the lost homes and businesses never were recovered. This renewed community is expressing its identity in the building of a Japanese cultural center. Other groups of Pacific peoples living in San Francisco also contribute to the diversity and cultural richness of the city.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT NINE -

Involved in redevelopment . . . Children play in front of condemned houses. The Western Addition, one area where the Redevelopment Agency is concentrating, was once a lovely residential area. With the fire of 1906 thousands of homeless people moved into this unburned section, and big houses were divided into flats, the beginning of the crowding which creates urban blight. In recent years refugees from poor areas of the nation have poured in here and the story continues. Blocks of houses have been leveled but rebuilding is slowed by relocation and low cost housing is scarce. People have had to crowd into the remaining houses, or move to the slums of neighboring cities, until more low cost housing is built. Many poor children in San Francisco have never seen the ocean, or crossed the bridges, and have little conception of the world beyond their small neighborhoods, a situation which educational projects are making an effort to remedy.

One of the rebuilt areas is St. Francis Square, a housing project for moderate income families built by the Longshoreman's Union. Families from many different ethnic and economic areas of the city have moved in together. Volunteer work and organization by the people who live here make this a new vigorous community where recently there were slums.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT TEN -

Dependent upon its bridges . . . Commuter cars flow off the Golden Gate Bridge. San Francisco is the core of a cluster of cities related to the harbor, politically separate but economically interdependent. Sugar and petroleum refineries, for example, are in East Bay and the main office in San Francisco. Geography limits the size of San Francisco, so that many of its workers must commute from the East Bay or the suburban cities to the south. Relatively little railroad service reaches into the city proper, and trucks also crowd the bridges. Until after the completion of the two main bridges in 1936 and 1937, traffic across the Bay was by ferry boats, which would carry up to 2300 passengers along with trucks and autos. Railroad cars were also ferried across the Bay. Since that time truck and auto traffic has increased so that the bridges are no longer adequate. Revival of ferry service is suggested, as well as additional bridges or tubes beneath the Bay. One tube is under construction by the Bay Area Rapid Transit District which is a point project being financed by Bay Area counties. Considered the most advanced in the world at the present time, this system is being studied during its testing and construction by transit engineers from major cities of the world. The citizens of San Francisco have sturdily resisted the construction of additional freeways through the city, and hope the rapid transit service will reduce the number of commuter cars being driven into the downtown area.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT ELEVEN -

A foggy harbor . . . The fog which hangs over the Golden Gate much of the time prevented the early sea explorers from discovering the entrance to the Bay. Fog sometimes interfers with airline schedules and highway traffic, but ocean traffic goes on. Lighthouses, bell buoys, and foghorns are still of use in navigation, though radio direction finders are the primary guides of modern navigators. Pilot boats meet incoming ships near a lightship anchored on the bar about three miles off shore. Some domestic ships are guided automatically by radar stations on shore, but all ships of foreign registry and most domestic ships are required to take on a pilot, a navigator experienced in the harbor's channels, before entering port.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

ELEMENT TWELVE -

Where fishermen catch crab . . . and other sea delicacies. Deep sea fishing is exciting both for pleasure and as an occupation. Many of the Italian and Portuguese immigrants who came to the Pacific Coast were skilled fishermen. They were able to save money, send for relatives from Europe, and buy land or start into business. Many of the Portuguese dairy farms north of the Bay and the Italian sea-food restaurants in San Francisco's North Beach are owned by fishermen and their relatives. Most of the hundreds of boats that dock at Fisherman's Wharf are family enterprises. One of the services of the Coast Guard is keeping small boats such as this informed of weather conditions. Flags are flown above Coast Guard stations whenever a storm is predicted. Two small red pennants warn the small pleasure sailboats in the Bay to stay in their harbor. One large red pennant is a gale warning, and a whole gale flag (red square with black square center) warns of very dangerous weather. The seagoing tradition of the Italian community in San Francisco is expressed in an annual pageant celebrating the arrival of that famous Italian, Columbus.

I. If you were using this information with children, which social science idea would you develop?

II. Write one important question you might pose to children in developing that idea.

APPENDIX B

CRITERION INSTRUMENT I

STRUCTURAL CONCEPTS AND GENERALIZATIONS

CRITERION INSTRUMENT I

STRUCTURAL CONCEPTS AND GENERALIZATIONS

<u>To the rater</u>:

Score the student's response <u>correct</u> (one point) if his response, in your judgment, is directly related to any of the structural learnings suggested for that particular element.

ELEMENT NO. 1

Central structural learning identified:

Geographic factors such as proximity to power resources, availability of raw materials, and accessibility of markets influence the location of commercial and industrial cities.

Ancillary structural learnings identified:

a. Choices made by people in adapting to their environment depend on such factors as cultural values, economic wants, degree of technological insight, and physical features.

b. Original industries tend to attract to their location related or satellite industries for a variety of reasons.

c. Social change is related to technological change.

d. Technological development leads man to exert greater control over his environment.

ELEMENT NO. 2

Central structural learnings identified:

A. Geographic factors such as proximity to power resources, availability of raw materials, and accessibility of markets influence the location of commercial and industrial cities.

B. Unprocessed raw materials constitute a major source of shipping tonnage in commercial-industrial centers.

Ancillary structural learnings identified:

a. Industrial societies place heavy demands on the earth's resources.

b. Increasing interdependence among peoples make exchange and trade a necessity in the modern world.

c. Trade arises between mutually accessible regions which produce surpluses of unlike commodities.

d. Location on inland waterways increases foreign commerce to those ports.

ELEMENT NO. 3

Central structural learnings identified:

A. The major factors in the industrial development of an area are proximity to a power source, availability of raw materials, accessibility of markets, labor supply, technological knowledge, and leadership.

B. A mutual dependence exists between a city and its major industries. Modern industries can become extremely powerful in exerting influence on a community.

C. Human societies are constantly undergoing change due in large part to technology in western societies.

Ancillary structural learnings identified:

a. Laws are often important in facilitating or inhibiting economic change.

b. Ford Motor Company is an example of vertical expansion (raw materials to finished product).

c. Economic decisions concerning what will be produced are generally based upon what society considers of most worth.

d. Historical events in modern society have significance far beyond their place on the earth.

ELEMENT NO. 4

Central structural learnings identified:

A. Mass production techniques such as the principle of division of labor as applied through the assembly line have resulted in greater efficiency and production.

B. Economic specialization has led to increased interdependence among people.

Ancillary structural learnings identified:

a. Original industries tend to attract satellite industries.

b. Some of the reasons for industrial expansion include proximity to new markets and efficiency and economy of production.

c. The past influences the present.

d. Increased transportation and communication are resulting in greater cultural diffusion.

ELEMENT NO. 5

Do not score Element No. 5.

ELEMENT NO. 6

Central structural learning identified:

Urbanization has accentuated problems of social disorganization, interpersonal relationships, and group interaction. Urban areas are often not melting pots.

Ancillary structural learnings identified:

a. All human beings, regardless of ethnic or racial background, are capable of contributing to any society.

b. Communication within rather than across racial and ethnic lines provides the basis for social unrest and possible violence.

c. Culture is socially learned and serves as a guide for human behavior.

d. Cultural borrowing and diffusion aid in development of a cosmopolitan society.

<u>ELEMENT NO. 7</u>

Central structural learnings identified:

A. <u>Technological invention is often caused by necessity; transportation means are based upon both the needs of people and how they meet geographic problems</u>.

B. <u>The past influences the present; traditions die slowly. Unique inventions tend to be retained past their practical need</u>.

ELEMENT NO. 8

Central structural learnings identified:

A. Every society has its own system of beliefs, knowledge, values, and traditions --- its culture.

B. Certain minority groups have been more resistent to assimilation into American society than others.

Ancillary structural learnings identified:

a. Housing patterns reinforce and perpetuate national identities.

b. Modern societies perceive economic welfare as a desired goal for their members.

c. Places on the earth have a distinctiveness which differentiates them from other places.

d. There is a conflict between unlimited wants and limited resources.

ELEMENT NO. 9

Do not score Element No. 9.

ELEMENT NO. 10

Central structural learnings identified:

A. Certain social functions such as transportation and communication are primary activities of all societies and such needs in part determine economic allocations.

B. Man changes natural features or invents means of alleviating their influences in order to meet his needs.

Ancillary structural learnings identified:

a. Large natural harbors usually develop into important seaports and become the nucleus of trade and industry.

b. Population growth presents mankind with one of the most challenging problems of our time.

c. Cars are inefficient as a means of mass transit.

d. Areas of the earth develop bonds, inter-connections, and relationships with other areas.

ELEMENT NO. 11

Central structural learning identified:

Technological innovation sometimes results because of economic necessity. Man tends to develop means to overcome features of nature which impede important economic endeavors.

Ancillary structural learnings identified:

a. Fog can limit the effectiveness of a harbor.

b. People living in similar natural settings of the world have to contend with similar phenomena.

c. Choices made by people in adapting to their environment may depend on physical factors such as weather, climate, water, and landscape.

ELEMENT NO. 12

Central structural learnings identified:

A. Culture is socially learned and serves as a potential guide for human behavior in a given society. People tend to gravitate to occupations paramount in their native land.

B. Geographic factors influence where and how men live and what they do.

C. One of the responsibilities of government is to provide essential services for the general welfare of its people.

Ancillary structural learnings identified:

a. All human beings are capable of participating in and contributing to any culture.

b. In any society, the number of consumers outnumbers the number of producers of goods and services.

c. Man's cultural adaptations result in great diversity in ways of living.

d. Bodies of water possess both economic and political importance as sources of food and industry.

APPENDIX C

CRITERION INSTRUMENT II

LEVELS OF QUESTIONING

CRITERION INSTRUMENT II

LEVELS OF QUESTIONING

AN ANALYSIS CHART FOR EVALUATING THE VERBAL BEHAVIOR OF TEACHERS

1.00 KNOWLEDGE

1.10 Knowledge of Specifics

Teacher:

a. asks questions, makes assignments or otherwise sets up situations which require children to give a term, symbol, meaning, definition or source of information, etc. related to what is being studied.

b. asks questions, makes assignments or otherwise sets up situations which require children to pronounce known words.

c. asks questions, makes assignments or otherwise sets up situations which draw terms, symbols, meanings or definitions, dates, events, persons, places, findings, sources of information on specific topics and problems, information about particular books, writings, etc. from children.

d. gives the terms, symbols, meanings or definitions, dates, events, persons, places, findings, sources of information on specific topics and problems, information about particular books, etc. to children.

1.20 Knowledge of Ways and Means of Dealing with Specifics

Teacher:

e. asks questions, makes assignments or otherwise sets up situations which require children to give conventional symbols used in map making and dictionaries, rules (of social behavior, form and usage in speech and writing, punctuation, etc.) styles or practices commonly employed in scholarly fields, etc.

f. asks questions, makes assignments or otherwise sets up situations which require children to state trends and sequences (interrelationships among a number of specific events which are separated by time).

g. asks questions, makes assignments or otherwise sets up situations which require children to state classifications and categories (classes, sets, divisions, arrangements which are useful for a particular subject field, purpose or problem).

h. asks questions, makes assignments or otherwise sets up situations which require children to state standards or criteria by which conduct, facts, and opinions are judged.

i. asks questions, makes assignments or otherwise sets up situations which require children to give the methods and procedures of attacking and/or solving various types of problems.

j. asks questions which draw statements of conventions, trends and sequences, classifications, categories, standards and criteria from children.

k. gives conventional symbols, rules, styles, trends, criteria, etc. to children.

1.30 Knowledge of Universals and Abstractions in a Field

Teacher:

l. asks questions, makes assignments or otherwise sets up situations which require children to give statements of generalizations, propositions, etc.

m. states or repeats generalizations, propositions, etc. for children.

n. asks questions which draw statements of generalizations, propositions, etc. from children.

o. uses illustrations, visual aids, concrete materials, etc. for helping children recognize or recall generalizations, propositions, etc.

2.00 COMPREHENSION

2.10 Translation - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

a. restate a problem, sentence, paragraph, etc. in their own words.

b. translate mathematical language to natural language or vice versa.

c. translate a long communication into a briefer or simpler form.

d. give an example, sample or illustration of a generalization, principle, concept, etc.

e. translate illustrations, maps, tables, diagrams, graphs, mathematical formulas, etc. to verbal form and vice versa.

f. give meaning in ordinary English of symbolic statements, phrases, words, etc. (metaphors, sarcasm, personification).

g. tell about a particular personal experience.

h. read a paragraph, sentence, page.

2.20 Interpretation - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

i. relate what has been read or heard to past experience.

j. compare or contrast ideas.

k. prepare a summary or outline of a situation read, heard, or observed.

l. give the meaning of cartoons, graphs, tables of numerical data, etc.

2.30 Extrapolation - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

m. solve problems which follow a generalization stated, revised or just developed.

n. tell what they think will happen next in a story.

o. give implications or consequences of what has been read, observed, heard.

p. draw conclusions.

3.00 APPLICATION

Teacher:

a. asks questions, makes assignments or otherwise sets up situations which require children to solve problems involving selection from a repertory of knowledge.

b. counters questions by children with questions or comments which will help children use what information they have.

c. points out and recalls for children previous situations that will give help in answering a question or solving a problem.

d. points out significant parts of the problem or question which will help children in solving a problem or answering a question.

4.00 ANALYSIS

4.10 Analysis of Elements - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

a. think through what the author is taking for granted.

b. distinguish between fact and opinion; fact and fancy; truth and make-believe.

c. think about what could have caused a person (in actual life situations) or character (in a story or play) to act as he did.

d. seek for meaning of pertinent terms in communications.

4.20 Analysis of Relationships - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

5.20 Production of a Plan or Proposed Set of Operations

Teacher:

e. provides opportunities for children to suggest ways of testing hypotheses.

f. and children formulate standards for taking care of themselves in various situations.

g. and children plan how the group will be organized to carry out a group-planned goal or answer group-formulated questions.

h. and children plan puppet shows, creative dramatic productions, etc.

5.30 Derivation of a Set of Abstract Relations

Teacher:

i. asks children to state what conclusions are justified by an experiment.

j. asks children to formulate hypotheses after problem has been defined.

k. presents many examples and then asks children to formulate the rule (generalization) the examples illustrate.

l. asks questions that help children deduce generalizations from many specifics.

6.00 EVALUATION

6.10 Judgement in Terms of Internal Evidence

Teacher:

a. and an individual child go over his reports, compositions and other written material to see if one idea follows another, if terms are consistently used, if words are selected which give the exact meaning intended, etc.

6.20 Judgement in Terms of External Criteria

b. helps children compare their behavior with standards they have previously developed.

c. helps children assess the pertinency and relevancy of material for a particular use.

e. identify conclusions and supporting statements in communications.

f. distinguish relevant from extraneous material.

g. note how one idea relates to another --- recognizing main and subordinate points.

h. identify parts of a story which give clues to time and place.

i. recognize causal relations.

j. arrange ideas in logical order.

k. identify pertinent aspects of a situation or problem. (Examples: Structural elements to pronounce unknown words. Crucial incidents in a background problem being discussed.)

4.30 Analysis of Organizational Principles - Teacher asks questions, makes assignments or otherwise sets up situations which require children to:

l. give evidence of the author's or speaker's techniques and purposes.

m. find patterns in addition and multiplication tables, and rules in games such as "What's My Rule," etc.

5.00 SYNTHESIS

5.10 Production of a Unique Communication

Teacher:

a. assigns topics for stories and art work that are broad enough for each child to find his own personal topics in them.

b. helps individuals who do not have ideas by asking questions designed to cause them to think of a personal experience to write about, express graphically, etc.

c. encourages playing with ideas and experimenting with words.

d. provides opportunities for children to create in a media of their choice.

d. encourages children to go over work they have completed to see that it is the way they want it.

e. helps children point out "the good" in their art work, stories, dramatizations, etc.

f. works with children to evaluate authorities or sources of information.

(Taken from: <u>Final Progress Report: The Teacher Education Project of the School of Education</u> (Kansas City, Missouri: University of Missouri at Kansas City, Ford Foundation Project, 1967), pp. 232-237.)

APPENDIX D

VERBAL INSTRUCTIONS GIVEN IN ADMINISTRATION OF THE COGNITIVE COMPLEXITY SCALE

VERBAL INSTRUCTIONS FOR MEASURE OF COGNITIVE COMPLEXITY

1. Write your name and student number on both sheets.

2. On the first sheet, list all of the one word associations you can think of to the term "Urban Education." You will have five minutes; make sure you list all of your associations only on the front side of the first sheet. Any questions?

   (After five minutes, continue directions.)

3. Next, using the list of words you have written, find as many ways of grouping or categorizing these words as you can. For example, if you had been given the term "Wood," you might have listed oak, pine, maple, etc. All of these associations could be classified under the category trees. Other examples of possible associations to the term "Wood" appear on the overhead. List the categories and also the words belonging under that category. Number the order in which each category occurred to you.

   ON OVERHEAD ---

1. Trees	2. Furniture	3. Lumber
Oak	Table	Plywood
Pine	Desk	Oak
Maple	Chair	Pine

   You again have five minutes. Begin.

   (After five minutes, continue directions.)

4. Now look at the lists you have just compiled. If you can think of any other ways these words can be grouped, do so. Continue to regroup until you can think of no more possibilities or until time is called. Be sure to indicate above each new list what the items have in common.

   (Time was then called after three minutes.)

TOTAL TIME OF ADMINISTRATION - 13 minutes