AN ANALYSIS OF AN INQUIRY-CENTERED, IN-SERVICE SOCIAL STUDIES PROGRAM FOR ELEMENTARY TEACHERS

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This is to certify that the

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ABSTRACT

AN ANALYSIS OF AN INQUIRY-CENTERED,
IN-SERVICE SOCIAL STUDIES PROGRAM
FOR ELEMENTARY TEACHERS

By

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The purpose of this study was to determine whether elementary teachers could be taught to use an inquiry method of social studies instruction. A conceptual model of inquiry-centered teaching was derived from a composite of historical models of inquiry. The model used in this study was correlated with a Flanders' type interaction analysis category system which defined teacher behaviors in an inquiry situation. The researcher then developed two courses of study to train teachers to use the model. Treatment A focused on teacher behaviors during inquiry experiences. Treatment B focused on materials which support inquiry experiences.

An experimental sample was drawn from the elementary teaching staff of the public school system of a midwestern university community. These teachers enrolled in an in-service social studies workshop. Two treatment groups were devised by separating enrollees into Groups A and B. These groups were supplemented by Group C composed of

elementary teachers within the system but not enrolled in the workshop. Groups A and B each received fifteen hours of instruction. Group C received no instruction.

Each of the teachers in Groups A, B, and C was videotaperecorded teaching a twenty minute social studies lesson to elementary children. Trained observers coded the videotapes using the interaction analysis category system defining teacher behaviors in an inquiry situation. Frequency data were compiled in matrices for each experimental group and for the control group.

Analysis of these data consisted of two discrete procedures. Each experimental group was compared to the conceptual model of inquiry teaching on the basis of an Inquiry Ratio. Inquiry Ratios were derived through a weighted comparison of categories within the model. Subsequently, the Darwin likelihood ratio criterion was applied to the frequency matrices representing the experimental groups. Experimental hypotheses were supported or rejected on the basis of these findings. These hypotheses stated that no difference would be found in the ability to use an inquiry method of social studies instruction between teachers taught to use the method and teachers not taught to use the method.

The Inquiry Ratio derived from the conceptual model was 2.0. An Inquiry Ratio of 2.0 or greater was accepted as meeting the criterion for inquiry teaching. Treatment

Group A recorded an Inquiry Ratio, I.R. = 3.69. Treatment Group B recorded an Inquiry Ratio, I.R. = 1.67. Control Group C recorded an Inquiry Ratio, I.R. = 0.5677. In view of these values, Group A was accepted as meeting the criterion for inquiry teaching and Groups B and C were rejected.

The data gathered were also analyzed using the Darwin likelihood ratio criterion. When z = 2.58 or greater, the null hypothesis is rejected at the .01 level of confidence. The Darwin criterion applied to frequency matrices representing experimental Groups A, B, and C and composite matrix A + B + C revealed z = 17.616. A similar analysis of Groups A and C and composite matrix A + C revealed z = 6.877. Comparison of Groups B and C and composited B + C showed z = 33.889. The analysis of Groups A and B and composite A + B showed z = 13.65.

Based on the analysis of data gathered in the study, each of the experimental hypotheses was rejected at the .01 level of confidence. As a result, several findings may be enumerated.

1. Teachers taught to use an inquiry method of social studies instruction in a short, in-service workshop will be significantly more able to use the method than teachers not taught to use the method.

2. Teachers taught to use an inquiry method of social studies instruction in a short, in-service workshop focusing on teacher behaviors during inquiry experiences

will be significantly more able to use the method than teachers not taught to use the method.

3. Teachers taught to use an inquiry method of social studies instruction in a short, in-service workshop focusing on materials which support inquiry experiences will be significantly more able to use the method than teachers not taught to use the method.

4. Teachers taught to use an inquiry method of social studies instruction in a short, in-service workshop focusing on teacher behaviors during inquiry experiences will be significantly more able to use the method than teachers taught to use the same method in a similar in-service workshop focusing on materials which support inquiry experiences.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

October, 1967, marked the tenth anniversary of the launching of the Russian Sputnik and the "Space Age." An immediate consequence of the space revolution was a similar revolution in American education. Traditional programs, teaching methods and materials were subjected to an agonizing reappraisal and sweeping changes ensued. Traditional textbooks and techniques were replaced as supplemental materials, multi-media presentations were introduced. Initially, the prime beneficiaries of these changes were the science and mathematics disciplines where "The New Math" and "Biological Science Curriculum Study" materials gained acceptance. Due to the close relationship of mathematics and science to the developing space exploration programs and the scarcity of funds it was not until the early sixties that the social studies came under careful, penetrating scrutiny.

By 1962 the growing awareness that public school social studies offerings had failed to keep pace with developments in other curricular areas coupled with new knowledge about the way children learn brought the demand for new materials and techniques. This demand was

answered with the establishment of more than forty Project Social Studies curriculum development centers across the United States. In these centers social scientists, teacher educators, and classroom teachers cooperated to develop new materials and techniques for teaching social studies. The progress reports of Project Social Studies centers provide indications of the characteristics of future social studies curricula.

New social studies materials and techniques reveal the influence of Jean Piaget's developmental theory of learning. Piaget[1] posited a four stage model of cognitive growth: (1) sensori-motor, birth to two years; (2) pre-operational or representational, two to six years: (3) concrete operations, seven to eleven years; and (4) formal operations, twelve to fifteen years. In the United States, Jerome Bruner[2] modified Piaget's model. Bruner's developmental model focuses on the final three stages of the Piaget model and tends to be less committed to a specific age range. Bruner[3] constructed a theory of instruction by applying the learning theory first to

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[1]Barbel Inhelder and Jean Piaget, The Growth of Logical Thinking From Childhood to Adolescence (New York: Basic Books, 1958.

[2]Jerome S. Bruner, The Process of Education (New York: Vintage Books, 1960).

[3]Jerome S. Bruner, Toward a Theory of Instruction (Cambridge: Belknap Press, 1966).

science and mathematics and subsequently to social studies. Bruner's theory focuses on the inquiry method of instruction and learning through directed discovery.

Many of the new social studies programs include a significant inquiry component: Fox and Lippitt,[4] Taba,[5] Fenton,[6] Massialas,[7] and others. Elementary school teachers are being encouraged to use these materials and consequently, to employ a method of inquiry in their classroom. This admonition is not new, deriving from the writings of Dewey,[8] Hullfish and Smith,[9] and Metcalf.[10] Doubts have however been raised which question: (1) whether an inquiry process does indeed exist

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[4]Robert S. Fox, Ronald Lippitt, and John Lohman, Teaching of Science Materials in the Elementary School, USOE Cooperative Research Project E-011 (Ann Arbor: University of Michigan, 1964).

[5]Hilda Taba and James Hills, Teacher Handbook for Contra Costa Social Studies, Grades 1-6 (Hayward, California: Rapid Printers and Lithographers, 1965.

[6]Edwin M. Fenton, Teaching the New Social Studies New York: Holt, Rinehart and Winston, Inc., 1966).

[7]Bryon G. Massialas and Benjamin C. Cox, Inquiry in Social Studies (New York: MeGraw Hill Book Co., 1966).

[8]John Dewey, How We Think (New York: D. C. Heath, 1933).

[9]H. Gordon Hullfish and Philip Smith, Reflective Thinking: The Method of Education (New York: Dodd, Mead and Co., Inc., 1961).

[10]Lawrence E. Metcalf, "Research of Teaching the Social Studies," in Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally and Co., 1963).

(Ausubel[11]), and (2) whether an individual can be taught an inquiry method per se (Gagne[12]). These doubts are expressed by classroom teachers who have exhibited reluctance to adopt new inquiry centered social studies programs either in part or in toto.

In order to evaluate the new social studies curricula they must find their way into classrooms and ultimately contribute to the education of children. The first objective in the process of evaluating new curricula is to establish an instructional situation where qualified teachers can test elements of those curricula. To accomplish this objective the teachers must understand the theoretical base of new materials and have the capability to use an inquiry method of instruction.

A cursory examination of the literature revealed the absence of agreement as to the existence of "A Method of Inquiry." Pursuit of this esoteric topic may prove an interesting intellectual enterprise but does not meet the needs of the classroom teacher or the instructor in a teacher education program. In contrast, Schwab,[13]

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[11]David P. Ausubel, The Psychology of Meaningful Verbal Learning (New York: Greene and Stratton, 1963).

[12]Robert M. Gagne, "Varieties of Learning and the Concept of Discovery," in Learning By Discovery: a Critical Appraisal, ed. by Lee S. Schulman and Evan R. Keislar (Chicago: Rand McNally, 1966).

[13]Joseph J. Schwab, supervisor, Biology Teachers' Handbook (New York: Wiley and Sons, 1963).

Suchman,[14] and Shulman,[15] have identified elements which constitute inquiry processes. Similarly, Hunt and Metcalf,[16] Fenton,[17] Massialas,[18] and Goldmark[19] have applied model inquiry processes in social studies instruction. Each of these methods has proven useful. Thus, an inquiry method can be identified for the purpose of instruction.

Gagne,[20] notes that there is no conclusive evidence that an individual can be taught to use an inquiry process. However, he concludes that the question remains open. Metcalf[21] calls for an inquiry into inquiry. There exists in the field of instruction in elementary school social studies a clear need to determine whether teachers can be

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[14]J. R. Suchman, "Inquiry Training: Building Skills for Autonomous Discovery," Merrill-Palmer Quarterly of Behavioral Development, 7:148-169, 1961

[15]Lee S. Shulman, Michael J. Loupe, and Richard M. Piper, Studies of the Inquiry Process (East Lansing: Educational Publication Service, College of Education, Michigan State University, RR-22, 1968).

[16]Maurice P. Hunt and Lawrence E. Metcalf, Teaching High School Social Studies (New York: Harper and Row, 1955).

[17]Fenton, loc. cit.

[18]Massialas and Cox, loc. cit.

[19]Bernice Goldmark, Social Studies: A Method of Inquiry (Belmont, California: Wadsworth Publishing Co., 1968).

[20]Gagne, loc. cit.

[21]Metcalf, loc. cit.

taught to use an inquiry method of instruction in elementary school social studies.

Purpose

The purpose of this study was to determine whether teachers in-service can be taught to use an inquiry method of instruction in their elementary school social studies classes. Data reported by this study will enable those charged with the responsibility for teacher education and professional development to meet the necessity of preparing their students and teachers to use significant curriculum developments effectively. This data includes the relative effectiveness of two treatments used to instruct teachers-in-service in the use of an inquiry method of social studies instruction. The treatment groups are described in a later section of this chapter.

Limitations of the Study

A thorough search of the literature revealed no previous researches focusing on instruction of teachers-in-service in an inquiry method of elementary social studies instruction. Therefore, this study will be exploratory in nature. This constituted the first limitation of the study. The population studied consisted of the elementary school classroom teachers in the East Lansing, Michigan public schools. East Lansing is a midwestern university community and the generalizability of results of this

study are limited to similar populations. A relatively small sample size also limited the generalizability of results. The experimentor taught both treatment groups and acknowledged this as a further limitation. The conceptual model of an inquiry teacher used in this study had not been utilized in previous researches. An additional limitation of the study was the single observation of each teacher involved in the study.

These limitations were necessitated by the availability of financing and subjects to the experimentor. They are acknowledged and contributed to the designation of this study as exploratory in nature.

Hypotheses

As stated above, this study was exploratory in nature. The lack of previous research data precludes the use of directional hypotheses, thus, all hypotheses will be stated in the null form. The present study examined the following hypotheses:

H_o 1. Teachers-in-service taught to use an inquiry method of social studies instruction will not be significantly more able to use that method than teachers-in-service not taught to use the same method.

H_o 1a. Teachers-in-service taught to use an inquiry method of social studies instruction by treatment A will not be significantly more able to use that method than teachers-in-service not taught to use the same method.

H_o 1b. Teachers-in-service taught to use an inquiry method of social studies instruction by treatment B will not be significantly more able to use that method than teachers-in-service not taught to use the same method.

H_o 2. Teachers-in-service taught to use an inquiry method of social studies instruction by treatment A will not be more able to use that method than teachers-in-service taught to use the same method of instruction by treatment B.

Assumptions

This study was based on the following assumptions:

1. Desired teacher behaviors in social studies instruction can be identified and described as behavioral objectives.
2. A plan of instruction can be designed which will modify teacher behavior to accomplish stated objectives for teacher behavior in social studies instruction.
3. An instrument can be designed which will effectively measure teacher behavior in social studies instruction in reference to stated objectives.

Definitions

For the purpose of this study the following operational definitions were used:

Social Studies

Those portions of social science that are selected for use in teaching in elementary and secondary schools.

Social Science

The fields of knowledge which deal with man's social behavior and his social institutions. The six social sciences which are most frequently drawn upon by elementary school social studies are anthropology, economics, geography, history, political science and sociology.

Behavioral Objective

The statement of desired teacher performance in terms of actions or activities which can be observed.

Instruction

This consists of leading the learner through a sequence of statements and restatements of a problem or body of knowledge that increases the learner's ability to grasp, transform and transfer what he is learning (Bruner[25]).

Inquiry

"A process of coming to grips with problematic situations which require the discovery of available techniques or the invention of new means for their resolution" (Shulman[26]).

Teacher-in-Service

A person holding a valid teaching credential currently employed as an elementary school classroom teacher.

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[25]Bruner, Toward a Theory of Instruction, op. cit.

[26]Shulman, op. cit., p. 2.

Design

This study was carried out in five stages. Each stage was designed to facilitate analysis of the relationship between teachers'-in-service ability to use an inquiry method of social studies instruction, the dependent variable, and an experimental methodology used to teach that method, the independent variable.

Stage I: Development of Materials

During the period of November 1, 1968 to January 1, 1969, the following items were developed.

1. A list of objectives was produced which stated in behavioral terms the desired teacher behaviors to be employed in teaching elementary school social studies.
2. An instrument was developed which will effectively measure teacher behaviors described in 1.
3. Two plans of instruction were designed to teach teachers-in-service to modify their behavior in the direction of stated objectives.
4. A conceptual model of an inquiry based social studies class situation was developed.

Stage II: Selection of Samples

The sample for this study was selected during the first week of January, 1969.

1. Population--teachers-in-service who indicated interest in enrolling in a graduate institute in social studies instruction to be held during January, February and March, 1969.
2. Sample--the teachers who actually enrolled in the institute noted above were separated by chance into two treatment groups.
3. Control--teachers who indicated interest in the institute described above but who did not actually enroll in that institute were chosen at random to constitute a control group.

Stage III: Treatment

Two plans of instruction designed to teach teachers-in-service to use an inquiry method in elementary school social studies instruction constituted the treatment. Each of the two treatment groups received fifteen hours of class instruction in the method. Sample groups were assigned to receive either treatment A or treatment B. Both treatments were designed to promote an inquiry method of social studies instruction. Treatment A focused on teacher behaviors during inquiry instruction. Treatment B focused on materials used during inquiry instruction. A complete description of Treatments A and B is given in Chapter III of this study. Teachers assigned to the control group received no treatment.

Stage IV: Observation

Subjects were observed teaching an inquiry based social studies lesson. Observations were recorded on video tape and coded using a form of interaction analysis instrument designed to measure teacher behavior in reference to stated objectives of inquiry instruction.

1. Observers were selected and trained in the use of the measurement device. (A copy of the instrument is appended.)
2. Subject teachers were asked to prepare a plan of instruction to teach a social science concept using an inquiry method of instruction and to teach the plan to a group of elementary school children.
3. All observations were made within a two week period. This would include observations of subjects in both treatment groups and the control group.

Stage V: Analysis of Data

Data collected through observations of subjects in an instructional situation were analyzed in two discrete statistical procedures. Experimental groups A and B and control group C were compared to the conceptual model of an inquiry teacher using an inquiry ratio derived from the criterion instrument. Secondly, experimental groups A and B and control group C were compared using the Darwin

likelihood ratio criterion[27] to test that two or more matrices are the same. The Darwin ratio criterion is described in Chapter III of this study.

Summary

This study, initially, examined the effectiveness of teaching teachers-in-service to use an inquiry method of elementary school social studies instruction. Secondly, the effect of two forms of treatment were examined.

Data was collected by observing the subjects in an actual teaching situation and analyzed using two discrete statistical procedures, an Inquiry Ratio derived from the model and the Darwin ratio criterion for comparing interaction matrices. Data reported will provide those charged with the responsibility of teacher education whether pre- or in-service with indications of the effectiveness of instruction in an inquiry method as well as the relative effectiveness of variant forms of instruction.

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[27] J. H. Darwin, "Note on the Comparison of Several Realizations of a Markov Chain," Biometrika, 46:412-419, 1959.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

This review of literature related to instruction of teachers-in-service in the use of an inquiry method of elementary school social studies instruction is presented in two sections. Section I consists of a rationale for inquiry as a method of instruction. The discussion is presented under three topics: (1) the development of thinking skills as an objective of social studies instruction, (2) classroom interaction as it effects learning, and (3) the effects of inquiry on the education of children. Section II consists of a discussion of the development and application of models of inquiry in education. The section includes the comparison of eleven historically significant models of inquiry.

I. Rationale for Inquiry

Developing Thinking Skills-- A Social Studies Objective

Commenting on "The New Social Studies," Edwin Fenton has written

> No two authorities state social studies objectives in exactly the same way. Most agree, however, that groups of objectives can be clustered under general headings, three of which occupy a place in virtually every scheme: the development inquiry skills (sometimes called critical thinking or the use of a mode of inquiry), the development of attitudes and values, and the acquisition of knowledge. Not that the three are truly separable. Without proper attitudes, a child cannot use inquiry skills. Without knowledge, there is nothing to inquire about.[1]

This discussion is primarily concerned with the relationship of the development of inquiry skills and the acquisition of knowledge as it impinges on teacher behavior in elementary school social studies instruction. Jerome Bruner states that "Instruction consists of leading the learner through a sequence of statements and restatements of a problem or body of knowledge that increase the learner's ability to grasp, transform and transfer what he is learning."[2] Bruner's view of instruction assumes the existence of appropriate problems optimally arranged to facilitate instruction. The "stuff" from which such problems are drawn is referred to as content. Parker and Rubin have defined content as "the compendium of information which comprises the learning material for a particular course or

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[1]Edwin Fenton, The New Social Studies (New York: Holt Rinehart and Winston, Inc., 1967), p. 11.

[2]Jerome S. Bruner, Toward a Theory of Instruction (Cambridge: Belknap Press, 1966), p. 49.

a given grade."[3] Delimiting this compendium constitutes a major problem of instruction.

The knowledge explosion of the twentieth century has affected every field of knowledge. The discovery of new information alters the position of previously known "facts." The revisionary nature of advancing scientific knowledge in every discipline multiplies the difficulty inherent in defining content for purposes of instruction. Schwab elucidates the temporary nature of knowledge and its implications for teaching:

> It follows that it is desirable, if not necessary, that we so teach that students understand that the knowledge we impart may be incompelte, is relatively ephemeral and is not mere litereal, "factual" truth. This means that we must clarify for students the role of substantive structures in making knowledge possible and limiting its validity and impart to students some idea of the particular structures which underlie the major bodies of present knowledge, together with the reasons for the appropriateness of these structures and some hint of their limitations.[4]

It follows that effective instruction must be based on the identification and understanding of the structure of a discipline. Structure has been discussed and described in attempts at definition. Social studies education appears best served by the two part definition of a discipline's structure described by Fenton as follows:

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[3]Cecil J. Parker and Louis J. Rubin, Process as Content: Curriculum Design and the Application of Knowledge (Chicago: Rand McNally, 1966).

[4]Joseph J. Schwab, "Problems, Topics and Issues," in Education and the Structure of Knowledge, ed. by Stanley Elam, 5th Annual PDK Symposium on Educational Research (Chicago: Rand McNally and Co., 1964), p. 10.

> The first consists of the ". . . body of imposed conceptions which define the investigated subject matter of that discipline and control its inquiries." The second is ". . . the pattern of its procedures, its method, how it goes about using its conceptions to attain its goals." In layman's language structure consists of a method of inquiry made up of two parts: the formation of a hypothesis and the process of proof.[5]

Each discipline is defined by the basic concepts and generalizations whose interrelationship form its structure. The concepts and generalizations are identified by the application of the process of proof appropriate to the particular discipline. It is through this process that the student of a discipline comes to understand the theory which gives the discipline unity. Theory is built on a hierarchy of structural concepts and generalizations. The disciplines of natural science aptly illustrate this point. Herbert Fiegl clarifies the meaning of structure and compares natural and social scientists in the following statement:

> The least general of these is the descriptive level. Just above the descriptive level, in a hierarchy of generality are empirical laws, and above these are various levels of theory. These levels can be illustrated by the example given above. The descriptive fact is that hands get warm when rubbed together. The empirical law is that friction produces heat. Above the empirical law at the first level of theory, there is classical thermodynamics. At the next level is statistical mechanics, or the kinetic theory of heat; and finally, at the most general theoretical level, quantum mechanics.
>
> As we go up in the hierarchy of theory we encompass more and more facts. The aim of scientific

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[5]Fenton, op. cit., p. 12.

> explanation, is to explain a given set of facts with a minimum of basic concepts and principles. The higher the level of theory, the greater the number of facts that can be explained with a given number of concepts and principles. Newton's laws explain more than Keplers, and Einstein's more than Newton's.
>
> The social scientists, like the natural scientists, strive to discover high-level theories which will explain many facts with a few simple concepts. An example is the common idea that most of history can be explained by the personalities and abilities of heroes.[6]

Fiegl's comments give direction to the determination of appropriate content for instruction. The compendium of knowledge will include the concepts and principles which give meaning to a discipline. Social studies draws its content from the social sciences. Having identified the appropriate structure teachers are in a position to organize their efforts for efficient instruction. One should note that substantive structures are not the end product of education but rather:

> Since substantive structures function to guide enquiry and organize the fruits of enquiry, they are significant to education not as matters to be learned in their own right, but in the context of enquiry. They need to be understood, not in and of themselves, but in their effect and operation: how they shape problems for enquiry; how they point to the data required to solve these problems; how they require us to interpret our data and fit the interpretations into the structure of the science; how they amend or enlarge the scope of enquiries conducted under the guidance of earlier structure.[7]

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[6]Herbert Fiegl, "Concepts and the Structure of Knowledge," in Concepts and Structure in the New Social Science Curricula, ed. by Irving Morrissett. A Report of a Conference at Purdue University, January 29-30, 1966, Sponsored by the Social Science Education Consortium, West Lafayette, Indiana, p. 11.

[7]Schwab, op. cit., p. 37.

Thus, the structure guides the teachers search for appropriate vehicles to facilitate instruction. In social studies the elements of structure include (1) the kinds of propositions sought, (2) the method used to seek it, (3) the nature of the evidence employed, and (4) the relation of the kind of knowledge sought to other kinds of knowledge.[8]

Having selected the elements of content teachers must select the most effective means of presentation. The method chosen must prepare students to understand fundamental relationships of structural elements. Students must also be prepared to perceive the relationship of specific facts to the total structure of a discipline as well as the interplay of concepts and principles of related disciplines.

Schwab points out that traditional expository methods of instruction utilizing a text which he characterizes as the "Rhetoric of Conclusions,"[9] is inappropriate in an era of new knowledge. Rather, Schwab calls for education which reflects cognizance of

> The possibility that present knowledge may be revised in the future. . . . Present knowledge in science is based on the best-tested facts and

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[8]William Oliver Martin, "The Structure of Knowledge in the Social Sciences," in Education and the Structure of Knowledge, ed. by Stanley Elam, 5th Annual PDK Symposium on Educational Research (Chicago: Rand McNally and Co., 1964), p. 197.

[9]Schwab, Biology Teachers' Handbook, op. cit.

> and concepts we presently possess . . . . It is the most reliable rational knowledge of which man is capable.[10]

Schwab's comments are applicable in all fields of learning and he argues for instruction which will enhance children's perceptions of the structure of the discipline.

Suchman follows Schwab's line of argument stating that "The educator should be concerned above all with the child's process of thinking, trusting that the growth of knowledge will follow in the wake of inquiry."[11] Suchman extends his argument to the entire curriculum as follows:

> Inquiry training is not proposed as a new way to teach science, but as a way of teaching basic cognitive skills that are just as important to the intellectual development of the child as reading and arithmetic. It belongs in science programs and in every other curriculum area that requires the performance of empirical operations, inductive and deductive reasoning, and the formulation and testing of hypotheses.[12]

The skills of which Schwab and Suchman speak are referred to as analytic skills or critical thinking. Speaking specifically of social studies, Lawrence Senesh states,

> The primary function of the development of analytical thinking is to help our youth understand the structure and the process of our society. With possession of analytic tools, our youth will be able to understand the dynamic changes of our society and the problems created by science and

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[10] Ibid., p. 46.

[11] Suchman, op. cit., p. 151.

[12] Ibid., p. 168.

> technology. In the final analysis, the purpose of social science education is the development of problem-solving ability.[13]

Traditionally, concern for the development of analytic skills through social studies has focused on the development of students' proficiency in reflective thinking. Dewey defined reflective thinking as the ". . . active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds that support it and further conclusions to which it tends."[14] Dewey's definition has been accepted as a referent for those who would examine the process of thinking and the development of analytic skills. Hullfish and Smith distinguish reflection from ". . . other looser kinds of thinking primarily by virtue of being directed or controlled by a purpose--the solving of a problem."[15] Hullfish and Smith advocate the analysis of thinking so that teachers might internalize a set of conceptual tools for an understanding of reflective thinking as "The Method of Teaching."[16] Subsequently, Massialas and Cox have described

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[13]Lawrence Senesh, "Organizing a Curriculum Around Social Science," in Concepts and Structure in the New Social Science Curricula, ed. by Irving Morrissett, A Report of A Conference at Purdue University, January 29-30, 1966, Sponsored by the Social Science Education Consortium, West Lafayette, Indiana, p. 21.

[14]Dewey, op. cit., p. 9.

[15]Hullfish and Smith, op. cit., p. 36.

[16]Ibid., p. 88.

reflective thinking as "the process of identifying problems of fact and value, assessing them in view of the assumptions in which they are grounded, and subjecting them to proof in terms of certain criteria."[17] The development of a theory of reflective teaching in secondary school social studies education has been enhanced by the contributions of Griffin,[18] and by Hunt and Metcalf.[19] Bayles' view of reflective-teaching focuses on the teacher as a chairman of a group of investigators who are thoughtfully carrying out their investigation.[20] Bayles notes that the inquiries are essentially responses to questions raised within the classroom situation. The answers to these questions are unknown. Study in the reflective classroom is then defined by the direction and length of time required to discover answers to those questions which initiated the study.

After studying the literature on reflective teaching, Trezise concluded that reflective method stresses

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[17]A. F. Griffin, "A Philosophical Approach to the Subject-Matter Preparation of Teachers of History" (unpublished Ph.D. dissertation, Ohio State University, 1942).

[18]Massialas and Cox, op. cit., p. 90.

[19]Hunt and Metcalf, op. cit.

[20]Ernest E. Bayles, Democratic Educational Theory (New York: Harper, 1950).

[21]Robert L. Trezise, "Reflective Teaching," Michigan Educational Journal, February, 1964.

intellectual development, not content.[21] The teacher using the reflective method encourages the students to examine statements to learn how true they actually are. The content teacher presents information as literal truth.

Successful use of reflective teaching is not guaranteed by its adoption. The teacher must initially develop his own skills of reflection and subsequently provide appropriate situations in which students may develop similar skills. Hullfish describes the problem of successful implementation:

> There are many obstructions, of course, that must be overcome, once teachers decide that the habits and attitudes they reveal in the daily work of the classroom are the determining factors in advancing or blocking the development of thinking on the part of students. None, of course, are greater than a teacher's failure to grasp what is involved in the reflective act, though teachers may believe that the greatest obstacle is the failure of students to be skilled in the reflective process. Now it is true that the students are not so skilled generally; yet the fact remains that their lack of skill is directly related to the presence or absence of skill on the part of the teachers. Students and teachers may learn together and it is to be hoped that they will; but it seems proper to anticipate that the leadership will come, as in the end it must, from the teacher.[22]

In the 1960's, the discussion of reflective method has been superseded by the consideration of inquiry as a method of instruction and learning. The use of a new label has not altered the basic nature of the process. Shulman has defined inquiry as "a process of coming to

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[22]Hullfish and Smith, op. cit., p. 197.

grips with problematic situations which require the discovery of available techniques or the invention of new means for their resolution."[23] Shulman acknowledges the fundamental relationship of his definition to Dewey's original conceptualization of reflection. This relationship will be amplified in the discussion of models of inquiry in a later section of this chapter. An alternate definition of inquiry in social studies education has been proposed by Goldmark as follows: "Inquiry is a reflexive, patterned search, which takes questions from the substantive level, to the criteria level, to the value and assumptions level, where new assumptions can be posed and new alternatives constructed."[24]

Acceptance of the development of analytic skills of critical thinking as a significant objective of social studies education necessitates the adoption of a reflective or inquiry method of teaching and learning. An important element of inquiry is the degree of interaction between teacher and student. Consideration of the effects of classroom interaction on learning is fundamental to the understanding of inquiry as a method of teaching.

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[23]Shulman, Loupe and Piper, op. cit., p. 3.

[24]Goldmark, op. cit., p. 7.

Classroom Interaction As It Effects Learning

Robert Soar has recently written that teachers and researchers alike would probably agree that

> Up to some point, increasing indirectness leads to greater subject-matter growth and more favorable attitudes, but beyond that point, further increases in teacher indirectness lead to decreased subject-matter growth and less favorable attitudes.[25]

Soar reviewed previous research dealing with achievement and anxiety level and then reported that

> . . . indirect control and a warm emotional climate contribute to growth in vocabulary, but that for reading the most growth was associated with either indirect control and a non-supportive climate, or direct control and a supportive climate. These findings were interpreted as paralleling the laboratory studies relating anxiety to learning. That is, that both direct control and a non-supportive climate induce stress on the pupil; that a minimum of stress is associated with most growth in vocabulary, but that for reading an intermediate level of stress was optimal.[26]

Soar further reports that teacher criticism shows significant negative correlation with achievement growth and that moderate correlation has been found between indirectness and pupil creativity growth.[27]

Soar's examination of interaction follows the tradition of research established under the direction of Flanders. Flanders examined the effects of teacher behavior

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[25] Robert S. Soar, "Optimum Teacher-Pupil Interaction for Pupil Growth," Educational Leadership/Research Supplement, Vol. 2, No. 3 (December, 1968), p. 275.

[26] Ibid., p. 276.

[27] Ibid.

on classroom climate and goals. He notes that:

> An interest in classroom socio-emotional climate starts on its upward trend in a study by Perkins whose work in turn was stimulated by H. H. Anderson and John Withall. He found that by using subjective ratings and a X^2 test of significance that significant relationships existed between group learning and patterns of interaction in training groups.[28]

Flanders developed a category system to identify the behavior of teachers and students in the classroom situation.[29] This category system, labelled interaction analysis, included ten mutually exclusive categories, seven of which pertained to teacher behavior, two to student behavior, and a final category recognized those incidents of silence or chaos which occur from time to time.

The teacher behavior categories: accepting feelings, praising and encouraging, using students' ideas, asking questions, lecturing, giving directions, and criticizing or justifying authority are of particular importance to the research reported in Chapters III and IV of this study. Flanders described the first four categories as indirect teacher influences and the last three as direct influences. This interaction analysis system was based on the assumption that indirect teacher influence expands the freedom

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[28]Ned A. Flanders, director, Helping Teachers Change Their Behavior. USOE Project 1721012, University of Michigan, Ann Arbor, April, 1963, p. 7.

[29]Ned A. Flanders, Teacher Influence, Pupil Attitudes and Achievement: Studies in Interaction Analysis (Minneapolis: Cooperative Research Project No. 397, 1960).

of student action. Behaviors were recorded in the classroom at three second intervals and compiled in interaction matrices which revealed the concentration of direct or indirect influence. The effect of teacher behavior on students was inferred from a ratio of indirect to direct teacher behavior.

Flanders examined sixteen mathematics teachers and sixteen social studies teachers who taught a two week unit of study in junior high school. He discovered that approximately two-thirds or more of the time someone is talking in the classroom it is the teacher.[30] Flanders suggested that teachers talk less and question more. He also recommended that in-service workshops take their focus from the need for teachers to change their behavior from direct to indirect influence.

Bellack and Davitz have also studied the linguistic patterns of classroom interaction.[31] They defined a system of pedagogical moves to explore the teaching act. These moves were labelled: structuring, soliciting, responding, and reacting. Bellack and Davitz used their system of pedagogical moves to analyze the teaching acts of fifteen high school teachers teaching a unit on international trade.

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[30] Ibid., p. 1.

[31] Arno A. Bellack and Joel R. Davitz, The Language of the Classroom (New York: Cooperative Research Project No. 1497, 1963).

Based on the analysis of data from tape recorded sessions, Bellack and Davitz defined the role of the student as well as that of the teacher. The teacher's role was described as characterized by, "a relatively high proportion of soliciting and reacting, with relatively less activity devoted to structuring and even less concerned with responding."[32] The student's role was summarized as follows:

> Pupils speak almost always in response to teacher's solicitations; occasionally they react; and in some classes they give reports or participate in debates. On the other hand, pupils infrequently ask questions, rarely structure the classroom discourse, and almost never summarize the preceding discussion. From a pedagogical point of view, the role of the pupil is indeed a limited one.[33]

The fact that these observations were made in high school classrooms does not exclude the conclusions from the current study. Any teacher whose instructional objectives include teaching reflectively must develop his students' questioning skills. Such skills require learning situations which afford the student time to practice. Those classrooms studied by Bellack and Davitz clearly did not provide a situation in which reflection might flurish.

A fundamental aspect of the analysis of classroom interaction as it effects learning is the identification of the types of thinking required within the teaching act.

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[32] Ibid., p. 84.

[33] Ibid., p. 84.

If the kinds of thinking taking place within a given classroom can be identified, evaluation of the teaching taking place will be facilitated. Aschner, Gallagher, Perry, and Afsar developed a code to analyze verbal interaction in relationship to student thinking.[34] Gallagher utilized this interaction code in a study of productive thinking.[35]

Gallagher defined productive thinking as thinking that an individual does "on his own." Gallagher sought to describe and classify the amount and quality of productive thinking exhibited by gifted junior high school students. The objective or a related study begun in 1959, was described by Aschner, "to develop a body of effective teaching procedures for cultivating the high-level thought process and intellectual productivity of gifted children in the classroom."[36]

Gallagher's research verified the need for a degree of intellectual stimulation beyond that found in most classrooms. He concluded that teaching practices must be

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[34]Mary J. Aschner, J. J. Gallagher, et al., "A System for Classifying Thought Processes in the Contest of Classroom Verbal Interaction," Institute for Research on Exceptional Children, University of Illinois, 1962 (mimeographed).

[35]James J. Gallagher, Analysis of Research on the Education of Gifted Children (Springfield: State of Illinois, Office of the Superintendent of Public Instruction, 1960).

[36]Mary J. Aschner, "The Analysis of Verbal Interaction in the Classroom," in Theory and Research in Teaching, ed. by Arno A. Bellack (New York: Teachers College, Columbia University, 1963).

altered to meet these needs. Gallagher noted the particular relationship between the teaching act, the types of teacher asked questions, and the categories of student thinking. He concluded that "It was the teacher's question that determined the focus of the classroom operation, and the style of question-asking determined the kinds of thought operations that the student would be asked to perform."[37] His results led to the further conclusion that there is a great need to study teaching style and to ascertain the implications of such style for student performance as well as to seek ways of modifying such style. Gallagher's recommendations closely parallel the conclusions of Hullfish who writes,

> The point of attack in bringing about significant reconstruction of education--in the classroom, at the level where mind meets mind--is the reconstruction of the teacher. It is this reorganization that is essential for the creation of a reflexive learning atmosphere."[38]

The current study is designed to explore alternative means of answering a portion of these needs, that is, the modification of teaching style. It was hypothesized that teachers-in-service exposed to a treatment which focused on behaviors defined in terms of Flander's category system would be more able to utilize an inquiry method of instruction than teachers-in-service not exposed to such a

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[37] Gallagher, op. cit.

[38] Hullfish and Smith, op. cit., p. 196.

treatment or teachers-in-service exposed to a treatment which focused on materials used in instruction.

A recent research conducted by Simon, Samph, Soar, and Amidon,[39] bears directly on the current study. Simon and his co-workers trained a group of student teachers to use the Flanders Interaction Analysis technique before they participated in student teaching. A control group was not given such training but was presented with the essential elements of learning theories. Both groups of subjects were then observed twice a week during their student teaching experience.

The results were in the hypothesized direction: student teachers trained in the Flanders technique were

> . . . more accepting, less critical, and less directive than student teachers not trained in Interaction Analysis; there was also a tendency for student teachers who learn Interaction Analysis to have more student initiated talk and less silence or confusion in their classroom than student teachers taught learning theory.[40]

The teacher and student behaviors identified in these studies are requisite to reflective teaching or an inquiry method of instruction. This is made clear in Massialas and Cox's description of the teacher's role in inquiry teaching as it applies to social studies, ". . . the teacher assumes

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[39]Anita Simon, et al., "Programing Teacher-Pupil Interaction Patterns," unpublished paper delivered at the American Educational Research Association, Chicago, February, 1966.

[40]Ibid., p. 62.

the role of manager or coordinator of inquiry into testable propositions about human affairs."[41] Similarly, Suchman described the student's behavior,

> Instead of devoting their efforts to storing information and recalling it on demand, they would be developing the cognitive functions needed to seek out and organize information in a way that would be the most productive of new concepts.[42]

These kinds of behavior are more likely to occur in an atmosphere of acceptance and support in which students and teachers are co-learners. Inquiry is best served by a pattern of classroom interaction in which teacher directed expository teaching is replaced by an open teacher-student, student-student dialogue. Teachers who seek to develop thinking skill through reflective thinking or inquiry must give particular attention to the degree of interaction occurring in their classrooms.

The Effects of Inquiry on the Education of Children

There exists today a considerable amount of confusion relative to the meaning of the terms discovery and inquiry. An examination of the literature in which the terms appear does little to clarify these terms. However, it appears that the term discovery is used to describe teaching situations characterized by the "a-ha" phenomenon--

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[41] Massialas and Cox, op. cit., p. 62.

[42] Suchman, op. cit., p. 151.

that is, a situation in which there are no preconceptions about what may be learned.

Jerome Bruner likens discovery to surprise.[43] He suggests that in each case the well prepared mind will capitalize on the situation. Bruner cites the following benefits of learning by discovery: (1) increase in intellectual potency, (2) shift from extrinsic to intrinsic reward, (3) learning the heuristic of discovery, and (4) aid to memory processing.[44] Bruner summarizes his hunches about discovery learning stating,

> . . . it is only through the exercise of problem solving and the effort of discovery that one learns the working heuristic of discovery, and the more one has practice, the more likely is one to generalize what one has learned into a style of problem solving that serves for any kind of task.[45]

Discovery may occur at any time, in any discipline. One who has prepared himself for discovery may be able to generalize his readiness to a wide range of learning experiences. Inquiry differs from discovery in as much as learning is focused on the search for alternate uses of interpretations of materials or situations provided by the teacher. The current study is concerned with an inquiry method of instruction.

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[43]Jerome S. Bruner, "The Act of Discovery," Harvard Educational Review, Vol. 31 (1961).

[44]Ibid.

Given the atmosphere in which inquiry flourishes, the question remains as to its demonstrated effectiveness in the learning process. In a recent review of research on discovery learning, Craig states:

> Current research on discovery has been addressed, most often, to questions about the effects of guidance by the teacher or experimenter. A recent volume (Shulman and Keislar, 1966), discusses the disappointing state of much of this research. In spite of the deficiencies and differences among studies, however, a careful analysis suggests that either guided learning or discovery techniques are effective depending on the nature of the task to be learned.[45]

Craig goes on to suggest that guided learning which follows a pattern of teaching in which the teacher states the rule to be learned, provides time for the students to practice the rule, and then tests to determine whether the rule has been learned may give better results when objectives focus on learning, retention, and application of what is learned.[46] Discovery techniques, on the other hand, which provide a situation in which the student discovers what is to be learned may be most appropriate when the instructional objectives are inference and/or the use of new principles or methods.

Schwab's description of the particular nature of inquiry provides an instructive comparison to Bruner's comments on discovery:

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[45]Robert C. Craig, "Recent Research on Discovery," Educational Leadership, Vol. 26, No. 5 (February, 1969), p. 501.

[46]Ibid.

> . . . enquiry [sic] is not a universal method or logic. There are differences among enquiries within science. There are even greater differences between scientific enquiry and enquiries which aim at decision and action. There are further differences between these and the activities appropriate to objects of art. Enquiry is far from being a universal logic. On the contrary, it is only a generic envelope for a plurality of concrete enquiries. Each one arises in relation to a specific subject matter and the essence of each lies in its own substantive conceptions, its own data, and its own questions asked and answered.[47]

Schwab's remarks impinge directly on a consideration of social studies inquiry teaching and hence on the current study. The modes of inquiry of the anthropologist, economist, sociologist, and so on may differ significantly. They may also include significant points of convergence. Generalizability in inquiry may extend only to the limits of a class of problems. These limits may be confined to a single discipline or extend across curricular areas. Asserting this position, Robert Gagne writes, "How large these classes may be remains to be demonstrated. It does not, however, seem likely that this generality of content can be very great."[48] Gagne does not close the door but concludes that, on the basis of current research, "There is no convincing evidence that one can learn to be a discoverer, in a general sense; but the question remains

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[47]Joseph J. Schwab, The Teaching of Science (Cambridge: Harvard University Press, 1962), p. 103.

[48]Lee S. Shulman and Evan R. Keislar, eds., Learning by Discovery A Critical Appraisal (Chicago: Rand McNally, 1966), p. 150.

an open one."[49] The current study was not designed to promote a universal inquiry. It was conceived as an attempt to change the behavior of teachers-in-service in a direction which would facilitate the application of any single mode of inquiry within the context of social studies instruction.

The most recent spate of interest in inquiry training followed the publication of a series of experiments carried on by Inhelder.[50] She based her researches on the developmental theory of Jean Piaget, the stages of which are listed in Chapter I of this work. Of particular interest was the concrete operation stage which is said to extend from age seven to age eleven and the formal operations stage extending from age eleven to age fifteen. The first encompasses the years of elementary education. The advent of the second may also occur for some children within elementary school years. Inhelder invited children to discover for themselves certain laws of physics using only simple apparatus such as balance beams. Children, during the intuitive stage, varied conditions haphazardly and observed what happened in particular cases without deriving any general principles. During the concrete stage one factor at a time was varied and its effects noted. The

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[49] Ibid.

[50] D. E. Berlyne, "Recent Developments in Piaget's Works," British Journal of Educational Psychology, Vol. 27 (1957), p. 9.

child was unable to carry out truly scientific investigations until he reached the formal operations stage. It was during this stage that the child varied the factors in a systematic order utilizing all possible operations. Berlyne summarizes these findings and concludes:

> The instructional implications are unmistakable: Children with no previous instruction seem capable of learning scientific laws in this way with more zest and understanding than by traditional teaching methods. But timing is important--they are not able to do this before the formal operations stage has been reached.[51]

A pervasive question remains regarding Piaget's stages, "How definite are the age ranges for each category?" The question is inspired by the fact that his sample consisted of only Swiss children and reflect serious methodological questions. A thorough examination of these questions is beyond the scope of the current study. However, the interested reader is referred to a recent compendium of research based on Piaget's theory, Logical Thinking in Children.[52] The exact age at which children maximize inquiry experience has not been established. However, several researches have established the contribution of inquiry training for elementary school children.

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[51] Ibid.

[52] Irving E. Sigel and Frank H. Hooper, Logical Thinking in Children (New York: Holt Rinehart and Winston, Inc., 1968).

Worthen examined the effect of typical experimental situations versus typical classroom situations.[53] Utilizing regular teachers in fifth and sixth grade classrooms he reported that his discovery group did better than a group taught concepts by teacher exposition on tests of retention after five and eleven weeks. Previously, Roughead and Scandura had examined "rule first" and "rule last" teaching in mathematics instruction.[54] They concluded that if there is an opportunity for discovery the discovery hypothesis holds.

Kersh found that discovery learning resulted in increased post-experimental practice in two of three experimental groups.[55] Kersh concluded that, "It makes little difference, apparently, whether the rule or principle is discovered or is taught directly, provided the learner is reinforced for effective practice in using the rule or principle."[56]

Perhaps the most conclusive argument for inquiry training springs from the search for means of motivating

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[53] B. R. Worthen, "Discovery and Expository Task Presentation in Elementary Mathematics," Journal of Educational Psychology, Monograph, Supplement, Vol. 59, No. 1, Part 2, 1968.

[54] W. G. Roughead and J. M. Scandura, "What is Learned in Mathematics Discovery," Journal of Educational Psychology, Vol. 59 (1968), pp. 283-289.

[55] Bert Y. Kersh, "Learning by Discovery: What is Learned," The Arithmetic Teacher, Vol. 11, No. 4 (April, 1964), pp. 226-231.

[56] Ibid.

children. It has become apparent that this is one of the most significant problems of instruction. Any revision of teaching techniques must be cognizant of this problem. Berlyne recognized this problem:

> In the course of the search for improved teaching methods that is now proceeding in many countries, educationists are finding that immense wells of intrinsic motivation lie within the normal child, which are capable of lending powerful support to the teacher's efforts when properly tapped but are all to often stopped up by traditional techniques of instruction.[57]

Berlyne suggests two means of tapping the reservoir of motivation within the child.[58] The first strategy is termed diversive exploration which is analogous to discovery teaching as described earlier. The second strategy is labelled "specific exploration" which parallels the description of inquiry training given earlier. Berlyne writes that:

> The indications are that specific exploration is occasioned by an aversive condition of a kind that may be called "perceptual curiosity." This condition is brought on by incomplete perception of a sector of the stimulus field, which leaves the subject with some uncertainty regarding its characteristics. The exploratory responses afford access to additional information, which reduces the uncertainty and thus relieves the perceptual curiosity.[59]

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[57] D. E. Berlyne, Structure and Direction in Thinking (New York: John Wiley and Sons, Inc., 1965), p. 264.

[58] Ibid., p. 244.

[59] Ibid.

In the context of inquiry training the teacher presents material or constructs a situation which induces an aversive condition in his students. The resultant perceptual curiosity carries the students through the process of inquiry to the point at which psychological equilibrium is restored.

Suchman summarizes the facts emerging from research on discovery/inquiry in three parts:

> (a) exploration, manipulation, and mastery are intrinsically motivating, (b) a reinforcing sense of power and self-confidence comes from successful autonomous discovery, and (c) the strategy of data intake and processing has an important effect on the productivity and depth of discovery.[60]

As noted earlier, the terms discovery and inquiry have been used interchangeably by the majority of writers. Suchman's comments apply equally to inquiry training. There seems to be little doubt that inquiry training will enhance learning. Questions remain as to the degree to which learning is enhanced. This may vary from subject to subject and student to student. Likewise, the efficiency of inquiry training is undetermined. Inquiry as a process of trial and error has been termed "error-full learning." As such, the amount of instructional time required is significantly greater than in directed learning. The answers to these questions await the results of appropriated research and the individual teacher's assessment of the

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[60] Suchman, op. cit., p. 151.

value to be derived from inquiry training by his children. Current knowledge does, however, suggest that all teachers be aware of inquiry's potential for learning and possess some facility in the behaviors associated with inquiry training. Those behaviors have been enumerated historically as models of inquiry.

Summary

Section I has consisted of a review of literature which tends to support inquiry as a method of social studies instruction. The discussion was presented in three sections which focused on the development of thinking skills as an objective of social studies instruction; classroom interaction as it effects learning; and the effects of inquiry on the education of children. The literature tends to support inquiry as an effective method of instruction. A majority of the authors discussed express reservations regarding inquiry as "the method" of instruction. They tend to accept inquiry as a potentially effective alternate method of instruction.

II. Inquiry Models

Historically Significant Models of Inquiry

This researcher has selected eleven models to illustrate the historical development of inquiry as a mode of learning, application of inquiry in specific disciplines of

knowledge, and varying foci of inquiry models for social studies learning and instruction. Each of these elements bears directly on the major hypotheses of the current study, that is, that teachers-in-service can be taught to use an inquiry method in elementary school social studies instruction. The major elements of the models discussed here are compared in Figure 1. Careful examination of the figure will reveal the fundamental similarities of all models.

It is readily apparent that John Dewey's model of inquiry formulated as the problem-solving method of learning provides the foundation on which later models have been built as well as the referant against which newer models are evaluated. Dewey's model described in How We Think,[61] includes five steps: (1) recognition of the problem, (2) analysis of the problem, (3) suggestion of possible solutions, (4) testing of consequences, and (5) judgement of selected solutions. Dewey sought to capitalize on the psychological state of discomfort sensed by an individual in a "problematic" situation. He reasoned that strategies developed to relieve this discomfort in a particular instance would form a repertoire which the learner might apply in subsequent situations. Thus, Dewey's model has been applied as a method of learning in all fields of knowledge.

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[61]Dewey, op. cit.

HISTORICAL MODELS OF INQUIRY

	Dewey 1933	Hunt and Metcalf 1955	Bruner 1960	Suchman 1960	Schwab 1964	Fox, Lippitt, and Lohman 1964
Step 1	Recognition of Problem	Belief (Preconception) Doubt	Create Uncertainty	Episode Analysis	Formulation of Problem	Classify Problem
Step 2	Analysis of the Problem			Determination of Relevance	Determination of Necessary Data	
Step 3	Suggestion of Possible Solutions	Ideas (Insights or Hypothses	Provide Data	Identification of Conditions	Plan Experiment	Observation Data Collection
Step 4	Testing of Consequences	Tests	Test Solutions	Induction of Related Constructs	Execute Experiment	Analysis and Determination of Behavior
Step 5	Judgement of Solutions	Tested Belief (Conception)	Conclusions		Interpretation	Conclusions

	Taba 1965	Massialas and Cox 1966	Clements 1967	Goldmark 1968	Shulman 1968
Step 1	Concept Formation	Orientation	Invent A Mystery	Recognition: Inquiry is Necessary	Problem Sensing
Step 2		Hypothesis Definition	Formation and Classification of Questions	Abduction of Alternate Hypotheses	Problem Formulation
Step 3		Exploration	Form Questions Which Direct Inquiry	Gathering Data	Search
Step 4	Interpretation of Data	Evidencing	Examination of Evidence		
Step 5	Application of Principles	Generalization	Concluding Reports	Inquiry Into Inquiry	Resolution

Fig. 1.--Historical models of inquiry.

More recently Taba developed a model consisting of three major divisions: concept formation, interpretation of data, and application of principles.[62] Each of Taba's divisions includes three subdivisions: overt activities which the child performs as a part of the learning behavior, covert mental operations which are inferred from the overt activities, and eliciting questions which are employed by the teacher to stimulate covert mental operations and overt activities. Taba assumes the existence of a problem and collapses Dewey's first three categories into one, concept formation. Her second and third categories parallel Dewey's fourth and fifth categories. Taba's model also may be generalized to learning per se, however, it has been most often utilized in social studies instruction.

Schulman accepted Dewey's model with slight modifications in a study of teachers-in-training.[63] Shulman focuses on behaviors which occur as subjects: (1) sense a problem, (2) formulate the specific problem to be solved, (3) search out data which will contribute to the solution, and (4) accomplishes the resolution of the problem. The variation noted in Shulman's model lies in step three which encompasses both the collection of data and testing of that data. Shulman describes search as "the measurable,

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[62] Taba and Hills, op. cit.

[63] Shulman, Loupe, and Piper, op. cit.

observable sequence of operations, questions, movements, frustrations, revisions of tactics, and the like, that the subject undertakes in order to transform the problem-as-formulated into a personally felt resolution."[64] The two models converge in step five, resolution. Clearly, this model is capable of wide application. Its signal value, however, lies in its application in the training of teachers in the use of a mode of inquiry.

Two of the models selected have been utilized primarily in science and mathematics instruction. Suchman lists three elements of a mode of inquiry as: episode analysis, determination of relevance, and identification of conditions, and induction of related constructs.[65] The first element clearly parallels Dewey's, recognition of the problem, however at element two some divergence is noted. Suchman's second element is appropriately considered with Dewey's second and third steps. Determinations of relevance calls for a manipulation of variables to determine the direction of search. Identification of conditions requires the student to determine what conditions are necessary to the outcome of the search. The induction of related constructs is the data testing step in which data is evaluated in terms of the structural

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[64] Ibid., p. 3.

[65] Suchman, op. cit.

concepts of the particular discipline. This is Suchman's final step and ends in the resolution of the problem.

Schwab's model of inquiry which forms the base of instruction for the Biological Science Curriculum Study, consists of seven steps.[66] Two of these steps have been omitted and two more collapsed in Figure 1, for purposes of clarity. Schwab begins with the formulation of the problem which is followed by a search for possible solutions. At this point he calls for a reformation of the problem to include these possible solutions. Having reformed the problem the student determines which data is necessary for solution and plans an experiment to generate the desired data. Step six calls for the execution of the experiment and collection of data. Step seven requires interpretation of the data by means of the guiding substantive structures together with previous knowledge possessed by the investigator. Schwab's model is particularly relevent for learning in the natural science disciplines. Its relationship to Suchman's model is readily apparent.

Four models have been developed to facilitate learning in the social studies both in elementary and secondary schools. They are discussed here with particular reference to their varying foci within social studies instruction.

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[66] G. W. Ford and Lawrence Pugno, The Structure of Knowledge and the Curriculum (Chicago: Rand McNally, 1964).

For more than a decade Lawrence Metcalf has served as a leading spokesman for reflective teaching in social studies. Therefore the model which he developed with Maurice Hunt[67] must be considered in any discussion of inquiry in social studies. Their model includes five steps: belief, doubt, ideas, tests, and tested beliefs. Hunt and Metcalf posit the notion that social studies learning must focus on those things in which the student has an emotional investment.[68] Belief, in this instance, is synonymous with preconception and reflects a previous value judgement. Doubt is aroused by a conflict between values. The idea step includes the formulation of insights or hypotheses which illustrate the consequences of acting in terms of the disputed values. The learner's insights and hypotheses are then tested in the light of collected data. Tested beliefs or conceptions result which reflect a value the pursuit of which seems to offer the best road for getting to some end not in doubt. Thus, the total process is one of resolving an individual's value conflicts in the light of social studies learning and instruction.

Fox, Lippitt and Lohman drew the focus of their model from the social-psychological aspects of social studies instruction.[69] Fox and his co-researchers

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[67] Hunt and Metcalf, op. cit.

[68] Ibid.

[69] Fox, Lippitt and Lohman, op. cit.

developed an eight step model in which children (1) classify the problem, (2) collect data, (3) look for clues to determine why particular consequences occur, (4) develop theories about causation, (5) determine what behaviors might lead to better consequences, (6) draw tentative conclusions, (7) review what social science says about the problem, and (8) generalize to their own behavior. As with Hunt and Metcalf, the Fox model is based on an emotional investment on the learner's part. Steps one and three resemble Dewey's model. It is step four that requires a different procedure. The learner applies a force field analysis to the situation. In this analysis the student attempts to establish social-psychological equilibrium by weighing the positive and negative forces present in the problematic situation. Negative and positive forces must be evaluated in terms of hypotheses about how to achieve better consequences. These hypotheses are developed by the learner. The learner must make a value commitment to reach a tentative solution. Subsequently, these tentative conclusions are re-evaluated in the light of social science data and the learner generalizes in terms of how he might shape his own behavior to achieve better consequences.

A model constructed by Massialas and Cox closely parallels Dewey's model. The Massialas model consists of six steps: orientation, hypotheses, definition,

exploration, evidencing, and generalization.[70] Their model is based on the assumption that teachers and students are co-inquirers and does not require an emotionally invested problem. However it supports inquiry into such problems.

Bernice Goldmark's model resembles Dewey's earlier model and is germane to the present study due to its final step, an inquiry into inquiry.[71] Goldmark contends that an inquiry must logically reach the point at which the student examines not only the resolution of a specific problem but the process by which the resolution was reached. This includes an examination of the assumptions on which the learner based his inquiry and the values which those assumptions indicate. Goldmark argues that such an examination is required for continuing effective inquiry.

Two additional models are particularly significant for social studies instruction. These indicate procedures which a teacher might follow when teaching through inquiry. Bruner indicates that a teacher should (1) create uncertainty in his sutdents regarding some aspect of their study, (2) supply data which the children can examine or manipulate, (3) provide time for learners to test their intuitive solutions and alternate solutions, and (4) assist the learners to formulate conclusions based on tested solutions.[72]

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[70]Massialas and Cox, op. cit., p. 21.

[71]Goldmark, op. cit.

[72]Bruner, Toward A Theory of Instruction, op. cit.

Bruner's model closely parallels Dewey's and is capable of wide application.

Millard Clements provides a model of inquiry based on a mystery model.[73] Clements suggests that the teacher invent a mystery which the class must solve. The students must then formulate and classify questions related to the mystery. These are analogous to the big questions such as "Who killed cock-robin?" To direct the inquiry the student formulates more specific questions such as "How was cock-robin killed?" Inquirers then collect and analyze evidence and write concluding reports.

Summary

Section II consisted of a discussion of eleven models of inquiry. Dewey's model was used as a referant to compare additional models developed by Hunt and Metcalf; Bruner; Suchman; Schwab; Fox, Lippitt and Lohman; Taba; Massialas and Cox; Clements; Goldmark; and Shulman. Points of convergence and divergence were noted. The models were also discussed in terms of their application within curricular areas. These models constitute the basis for the model of an inquiry teacher used in the current study. That model is described in Chapter III of this study.

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[73]Millard Clements, "The Disciplines and Social Study," in Effective Thinking in the Social Studies, ed. by Jean Fair and Fannie R. Shaftel, 37th Yearbook (Washington, D. C.: National Council for the Social Studies, 1967).

CHAPTER III

DESIGN OF THE STUDY

This chapter describes each stage in the experimental design. Also included are a discussion of the conceptual model of an inquiry teacher used in the study, treatment procedures, observation techniques, and the procedures for coding and analyzing the data.

The procedural elements of the study consisted of seven specific stages which fell into two major sections. Section I focused on the development of an experimental methodology to train teachers in the use of an inquiry method of social studies instruction, and included four stages: (1) construction of a conceptual model of an inquiry teacher, (2) development of materials, (3) selection of the sample, and (4) treatment of teachers through an in-service workshop. Section II dealt with the collection, analysis, and interpretation of data regarding experimental methodology. It included three stages: (1) observation of teachers, (2) formulation of experimental hypotheses, and (3) treatment of data.

I. Training the Teachers

The purpose of the study was to determine whether teachers-in-service could be taught to use an inquiry method of social studies instruction in their elementary school classrooms. Initially, the experimenter adopted a model of an inquiry teacher and developed a course of instruction for an in-service social studies workshop. This was followed by selection of the sample population and treatment of the experimental teachers by exposure to the experimental course of study.

A Conceptual Model of Teacher Inquiry Behavior

Analysis of inquiry models showed that interaction among students and teachers is an identifying characteristic of this method of instruction. Therefore, a conceptual model of teacher inquiry behavior must include behaviors which stimulate interaction.

Interaction consists of a series of events each of which is a result of its antecedent event. Once an event has occurred, a prediction can be made about the next event. For example, if a teacher is lecturing the probability that a student will talk next is relatively low, if the teacher asks a question the probability that the following event will be a student's response increases.

In order to effectively evaluate teacher inquiry behavior the criterion instrument should provide for the

sequential nature of interaction events. After evaluating methods of systematic classroom observation Medley and Mitzel concluded, "Flanders has developed the most sophisticated technique for observing climate thus far, one which is unique in that it preserves a certain amount of information regarding the sequence of behavior."[1] Flanders' original system encompasses all the behaviors common to the classroom. A model of teacher behavior correlated with such an instrument provides both a description of desired behaviors and a method of evaluation. The conceptual model used in the current study was derived from Flanders' ten category interaction analysis system.[2]

Zevin, a doctoral candidate at the University of Michigan, constructed a model of an inquiry teacher based on an analysis of previously published models of inquiry. Zevin and Ehman, a fellow doctoral candidate, adapted Flanders' original ten category system to illustrate the model of an inquiry teacher. Their instrument, entitled Categories For The Analysis of Teacher Behavior In An Inquiry Situation, includes Flanders' original ten categories and fourteen sub-categories. The category system was used

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[1]Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior By Systematic Observation," in Handbook of Research on Teaching, ed. by Gage (Chicago: Rand McNally and Co., 1963), p. 271.

[2]Flanders, Teacher Influence, Pupil Attitudes, and Achievement, op. cit.

in this study with their permission.[3] The category system is as follows:[4]

A. Teacher Behavior

1. Accepts feelings
2. Praises or encourages
3. Uses student's statement or behavior
4. Asks questions
    1. Narrow non-normative
    2. Broad non-normative
    3. Normative
5. Lecturing
6. Giving directions
    1. Commands
    2. Suggests
7. Criticizing or justifying authority

B. Student Behavior

8. Responses
    1. Narrow non-normative
    2. Broad non-normative
    3. Normative
9. Initiation
    1. Student-teacher non-normative
    2. Student-teacher normative

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[3]Jack Zevin, personal correspondence, December 5, 1968.

[4]See Appendix.

3. Student-student non-normative

4. Student-student normative

10. Silence or fragmented discussion

1. Fragmented but relevant discussion

2. Irrelevant and disorganized conversation.

This category system is correlated with a precise model of the inquiry teacher derived by Zevin. His model does not purport to include all the behaviors occurring within the context of inquiry but rather focuses on those behaviors deemed characteristic of inquiry by authors discussed in this study. Zevin states that:

> One of the most important features of the inquiry classroom concerns the level of discussion taking place. This includes a great deal of hypothesis formation, testing of alternative explorations, and building of generalizations. The category system presented above does make an attempt to differentiate between lower (4-1, 8-1) and higher (4-2, 8-2) level questions and answers. Perhaps this breakdown can be made more sophisticated at a future time. The single category for higher level questions could be subdivided into several parts, each of which describes a rising level of intellectual investigation.[5]

Zevin translated previous descriptions of the inquiry classroom into a model that can be described in terms of the category system discussed above. The model produces the following set of percentages for each behavior coded:

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[5]Zevin, op. cit.

Category	Model Percentage	
1	(negligible)	
2	(negligible)	
3	10%	
4-1	2%	
4-2	5%	Teacher Talk
4-3	2%	30%
5	5%	
6-1	3%	
6-2	3%	
7	0	
8-1	4%	Student Talk
8-2	8%	70%
8-3	4%	
9-1	20%	
9-2	7%	
9-3	20%	
9-4	7%	
10-1	No Prediction	
10-2	No Prediction	

The model provides a precise set of criteria which may be utilized as a standard against which the behavior of an inquiry classroom may be measured. The most important indicators of inquiry in the model are the variables 3, 4-2, 4-3, and 6-2 for the teacher, and 8-2, 8-3, 9-1, 9-3, and 9-4 for the students. The percentages in the model were made very high for these categories since 'fit' was being measured and it was not expected that any teacher would exactly match the percentage system.

Downgraded variables in terms of the inquiry model are 4-1, 5, 6-1 for the teacher, and 8-1 for the students. Flanders suggests that a ratio be developed as a measurement of teacher, or of classroom performance based on a comparison of desirable versus undesirable behaviors.

Thus, for the inquiry teacher, the ratio would be calculated as follows:

$$\text{Inquiry Ratio} = \frac{\text{Categories } 3+(4-2)+(4-3)+(6-2)}{\text{Categories } (4-1)+5+(6-1)}$$

$$\text{For the Social Studies Teacher} = \frac{10\% + 5\% + 2\% + 3\%}{2\% + 5\% + 3\%} = \frac{20}{10}$$

$$= 2.0$$

Exact numerical standards have thus been derived from the more general model of the inquiry classroom in social studies. These standards encompass a teacher's behaviors in the classroom. It also includes the types of behaviors he generates or encourages in his students. Teacher behavior was evaluated against these explicit criteria as a way of testing approximation in the direction of the desired goal--to utilize a model of inquiry instruction in elementary school social studies.

Development of Materials

During the period from November 1, 1968 to January 1, 1969, the researcher developed materials to be used in the study. These materials included:

1. A set of objectives in which desired teacher behaviors were stated in behavioral terms.
2. An instrument which effectively measured the behaviors described in the listed objectives.

3. Two plans of instruction designed to train teachers-in-service to modify their behavior in the direction of the stated objectives.

4. A conceptual model of an inquiry teacher.

Objectives were developed by the researcher which described desired teacher behaviors. Two areas of importance were selected for these objectives: classroom climate and instructional interaction. Teachers in the experimental groups were encouraged to develop in their classroom a psychologically safe atmosphere and, in their instruction, a non-directed teaching style. The related objectives are stated and discussed below.

> Objective 1: teachers will develop a psychologically safe classroom atmosphere illustrated by children's willingness to respond to teacher initiated dialogue, profer their own ideas and opinions, and initiation of student-teacher and student-student interaction.

To accomplish Objective 1 the researcher suggested that experimental teachers concentrate on non-judgmental attitudes, encourage students' participation through supportive statements, and praise student contributions to classroom interaction. Experimental teachers were taught to exhibit concern for ideas expressed by their students. Teachers were also asked to provide opportunities for interaction during social studies instruction. They were encouraged to avoid making judgments regarding student's contributions to classroom discourse, because for inquiry to flourish, the students must feel free to express themselves without fear of ridicule or derision.

Objective 2: teachers will adopt the model of inquiry on which this study is based and will exhibit this method of instruction in their social studies classroom as measured by analysis of classroom interaction.

Teacher behavior was stated as a general objective which paralleled the major hypothesis of the study. Subsequently, elements of teacher behavior were isolated as the measurement instrument was developed. The treatment was designed to focus the instructor's activities and the experimental teachers' attention on behaviors related to categories: (2) praising and encouraging, (3) using student's statements or behaviors, and (4) asking questions. These behaviors constitute a major emphasis of teacher behavior within the conceptual model of inquiry utilized in this study. They were referred to as "upgraded categories" and were judged by the experimenter to define teacher behavior in an inquiry method of instruction.

Categories 8 (responding) and 9 (initiating) also received significant attention during the workshop. These categories illustrate student behaviors characteristic of social studies inquiry and were thus of importance to the experimental teachers. Although the focus of this study was teacher behavior, the experimenter found that it was impossible to isolate teacher behavior from student behavior in an instructional setting. In addition, student behavior reflects and influences teacher behavior within the inquiry situation and is therefore a source of pertinent data.

Description of teacher behavior within the category system employed in the study resulted in the development of seven additional objectives for teacher behavior. These objectives are listed as ancillary objectives.

> Objective 2a: Experimental teachers will spend a greater portion of social studies instructional time using student's statements or behaviors than non-experimental teachers.
>
> Objective 2b: Experimental teachers will spend a greater portion of social studies instructional time asking broad non-normative questions than non-experimental teachers.
>
> Objective 2c: Experimental teachers will spend a greater portion of social studies instructional time asking normative questions than non-experimental teachers.
>
> Objective 2d: Experimental teachers will spend a greater portion of social studies instructional time giving directions through suggestions than non-experimental teachers.
>
> Objective 2e: Experimental teachers will spend a smaller portion of social studies instructional time asking narrow non-normative questions than non-experimental teachers.
>
> Objective 2f: Experimental teachers will spend a smaller portion of social studies instructional time lecturing than non-experimental teachers.
>
> Objective 2g: Experimental teachers will spend a smaller portion of social studies instructional time giving directions through commands than non-experimental teachers.

Treatment materials included lesson plans and materials for five three hour institute sessions. Lesson plans described the instructional techniques used and the student activities planned. Among the materials used were assignment plans, reprints of journal articles, handouts

developed by the instructor, and excerpts from appropriate teacher texts. Procedures and materials will be discussed in a later section of this chapter.

Selection of the Sample

The population for the study consisted of one hundred-twelve elementary school classroom teachers employed by the East Lansing, Michigan public school system during the 1968-1969 school year. These teachers were polled during December, 1968, to determine their interest in attending a social studies workshop on inquiry instruction in social studies. The workshop was to be offered by Michigan State University from January to March, 1969. Teachers were informed that the workshop would meet one day per week, would carry three graduate credits and that they would pay their own tuition. These stipulations imposed initial limitations on the study, since of sixty teachers who originally indicated interest in attending a workshop, only fourteen teachers actually enrolled in the workshop.

Although the sample of 14 participants limited the generalizability of findings, it was determined adequate for an exploratory study. This decision was based on time limitations and the availability of adequate statistical procedures. These procedures are described in a later section of this chapter. The purpose of the study was to determine whether teachers-in-service could be taught to

use an inquiry method of social studies instruction. It appeared that a partial answer might be found by treating an enthusiastic volunteer group. If this sample met the objectives, other groups might also be expected to do so. On the other hand, if this group could not meet the objectives, it might indicate that less enthusiastic groups under less positive conditions might also fail.

The fourteen teachers enrolled in the workshop were divided into two convenience groups. Seven teachers chose to meet in the evening and seven chose to meet in the afternoon. Seven additional teachers were randomly selected from the group which originally expressed interest in the institute but did not enroll. These teachers served as the control group.

Through chance determination, the afternoon group was designated Group A and its treatment then labelled Treatment A. Similarly, the evening group was designated Group B and its treatment Treatment B. The control group, Group C, received no treatment and was in fact never in direct contact with the experimenter. Relevant data concerning the backgrounds of the three groups appears in Table 3.1.

Group A consisted of seven female teachers whose mean number of years teaching was 10.5. The teachers taught grades one through six. Their social science background included an average of 28.5 term hours of course credit.

TABLE 3.1.--Background Data of Experimental Groups.

	Group A	Group B	Group C
Mean Number of Years Teaching	10.5	18.5	10.0
Mean Number of Social Science Course Credits	28.5	35.3	19.5
Mean Number of Social Studies Minutes/Week	180.0	147.5	150.4
Methods of Social Studies Instruction			
Undergraduate	6	2	3
Graduate	3	1	1
Sex			
Female	7	5	6
Male	0	2	1

Group A teachers averaged 180.0 minutes of social studies instruction per week. Only one Group A teacher had not had a social studies teaching methods course at either the undergraduate or graduate level. Three had had both undergraduate and graduate courses.

Group B consisted of five female and two male teachers whose mean number of years teaching was 18.5. Their social science background included an average of 35.3 term hours of course credit. Only three members of Group B had had a course in social studies teaching methods at either the

undergraduate or graduate level. Group B teachers averaged 147.5 minutes of social studies instruction per week.

Group C consisted of six female and one male teachers whose mean number of years teaching was 10. Their social science background included an average of 19.5 term hours of course credit. Three members of Group C had had a course in social studies teaching methods at the undergraduate level. One had had a graduate level methods course. Group C teachers averaged 150.4 minutes of social studies instruction per week.

None of the teachers involved in the study were told that they were involved in an experiment. They participated as part of their individual professional growth programs. Post-experiment interviews indicated that only one of the 21 teachers involved suspected that the workshop was serving an additional unannounced purpose.

Treatment

Two treatments were utilized. Each treatment consisted of five three-hour instructional periods or a total of fifteen hours. Both treatments were designed to promote an inquiry methodology of social studies instruction in elementary school classrooms. The treatment groups were taught by the experimenter. Treatments A and B differed in terms of the focus of instructional time. Treatment A focused on behaviors which teachers exhibit in an inquiry method of instruction. Treatment B focused on materials

which might be used to stimulate inquiry experiences in elementary school classrooms.

Treatment A instructional techniques included demonstration lessons, modeling, shaping and the use of the method of inquiry in each of the fifteen hours of instruction. Group A was introduced to inquiry techniques through a series of journal articles.

Early emphasis was placed on establishing a psychologically safe classroom atmosphere. Through discussion Group A was brought to an awareness that children would not participate effectively in inquiry experiences unless they were free of fear of ridicule or derision from the teacher or their own peer group. Situations were constructed within the group to illustrate open and closed classes or those of psychological safety as opposed to those of psychological fear. Group A teachers were instructed in the use of the Verbal Interaction Category System (VICS) described by Amidon and Hunter.[6] This system was developed as a tool for teacher education. Through its use the teacher becomes aware of the importance of verbal behavior in the classroom. Group A teachers were encouraged to use the VICS in their classrooms. They were further instructed in the importance on interaction in the classroom and participated in practice sessions in which the classroom interaction was analyzed.

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[6]Edmund Amidon and Elizabeth Hunter, Improving Teaching (New York: Holt, Rinehart and Winston, Inc., 1967).

Each Group A training session began with a demonstration inquiry lesson taught by the experimenter. These lessons were followed by careful joint analysis by both experimenter and teachers of the behaviors exhibited by both teacher and students during the lesson. The analysis compared the behaviors to the model set out earlier. Particular attention was given to the questions asked within the context of the inquiry situation. Group A teachers were asked to revise the setting or sequence of instruction to heighten potential for inquiry.

Group A teachers were asked to select social studies topics and to write original case studies which would support their efforts to teach these topics through inquiry. The teachers were urged to construct sets of questions based on the case studies which might direct classroom inquiry. The experimenter recommended that these materials be used by the teachers in their classrooms. Each of the Group A teachers followed the recommendations and subsequently reported their experiences to the group. Two of the teachers made audio-tape recordings of their trial efforts. These recordings were played for the group and analyzed with reference to the inquiry model.

Experimental teachers in Group A also participated in role-playing experiences which emphasized inquiry into the affective dimension of social studies learning. In every case the participants analyzed their behavior with

reference to the model of an inquiry teacher. In each case secondary emphasis was placed on the materials used as vehicles for instruction. The importance of these materials was acknowledged and their characteristics studied but always in terms of the behaviors they might elicit or support.

Treatment B instructional techniques included lecturing, requiring written assignments, and analysis of materials produced. Group B was introduced to inquiry instruction through a series of lectures which described materials used as spring-boards to inquiry. They were told how to use inquiry centered materials but were not given demonstrations. Materials were analyzed for their potential as vehicles through which to present social studies topics.

Group B was assigned the task of writing case studies that would support inquiry activities in their classrooms. They were encouraged to try these materials in their classrooms. All Group B teachers followed the suggested procedure and reported results to the group. The individual reports were analyzed according to the materials used rather than the method of presentation.

Group B spent a portion of each training session reworking the social studies curriculum guide utilized in their school district. Individual members of the group rewrote portions of the guide in order to make them more compatible with inquiry instruction.

Members of Group B were not provided with the VICS information; nor were they instructed in any other form of interaction analysis. They did not participate in role-playing or practice questioning strategies although some produced materials which were designed to support such activities. Treatment B was predominantly materials-oriented and although behaviors were acknolwedged as important, the group's attention was a directed to the materials involved in inquiry instruction.

The final phase in both treatments was the same. Each teacher was asked to prepare a plan of instruction for a twenty-minute social studies lesson and to teach that lesson using the method of inquiry learned during the institute. Teachers selected to comprise the control group, Group C, were also asked to prepare and teach a twenty-minute social studies lesson using an inquiry method of instruction.

Summary

Section I consisted of a description of the criterion instrument used in the study. The instrument consists of a Flander's type interaction analysis system subscripted by Lee Ehman and Jack Zevin. Materials employed during the study were discussed and the procedure for selection of the sample was described. Characteristics of the sample population were set out and a discussion of the treatment procedure followed. Each treatment group received fifteen

hours of instruction in a method of inquiry instruction. Treatment A focused on teacher behavior during an inquiry experience. Treatment B focused on materials used during an inquiry experience.

II. Collection and Analysis of Data

This section describes observational techniques used in the study. The experimental hypotheses are presented and procedures for statistical analysis are discussed.

Observation

Each experimental teacher and each control teacher was asked to teach a twenty-minute lesson and to allow the experimenter to record the lesson on videotape. All teachers agreed to this procedure and a schedule was drawn. Videotaping began on March 10, 1969, and was completed on March 14, 1969.

The purpose of the observation was to evaluate the individual teacher's behavior. Every attempt was made to insure an optimum situation in which the teacher might demonstrate his ability to use the method of inquiry. Each teacher was therefore permitted to select the topic for the lesson, the setting in which to teach, and the group of pupils to be taught. Eighteen of the twenty-one teachers chose to teach their full class in their own classroom. Three of the experimental teachers chose to limit the number of children participating: two of these

taught their groups in their normal classroom while one elected to move the group to the school library. The classes that were videotaped ranged in size from eleven to thirty-four students. Most of the children involved in the lessons had previously been videotaped and were familiar with the equipment and procedures and readily accepted its presence in their classroom.

Each videotape was evaluated by trained observers using the category system described earlier. Two coders, graduate students in the College of Education of Michigan State University, were employed during the study. After memorizing the category system they participated in training sessions totalling ten hours. Training activities included discussions of the categories, practice with first audio-taperecordings and then video-taperecordings, and introduction to tabulating procedures. Trial reliability checks were made during each training session.

The reliability coefficient used in this study is called "the Scott Index." The method of calculation is explained in detail by Flanders.[7] In essence a ratio is set up in which the per cent agreement between two observers less what might be expected by chance is divided by perfect agreement less what might be expected by chance. The formula used is as follows:

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[7]Ned Flanders, Interaction Analysis in the Classroom: a Manual for Observers (Ann Arbor: University of Michigan, School of Education, 1966).

$$\text{Scott Index} = \frac{P_o - P_e}{100 - P_e}$$

P_o is the per cent of agreement, and P_e is the percentage of agreement expected by chance which is found by squaring the proportion of tallies in each category, summing these over all categories, and multiplying by 100. At the conclusion of training session one, coder reliability was .67. Reliability rose to .86 during the second training session and reached .92 at the end of the third training session.

Coding sessions were scheduled to immediately follow recording sessions. Thus, coding began March 10, 1969, and was completed March 14, 1969.

Statistical Hypotheses

The objectives of the social studies workshop described earlier may be translated into statistical hypotheses for the purpose of analysis. The statistical hypotheses generated are stated below. Due to the exploratory nature of the study major hypotheses were stated in the null form.

> Hypothesis 1: Teachers-in-service taught to use an inquiry method of social studies instruction will not be significantly more able to use that method than teachers-in-service not taught to use the method.
>
> Symbolically: H_o: T = C
>
> Legend: T = treated teachers-in-service
> C = non-treated teachers-in-service

Hypothesis 1a: Teachers-in-service taught to use an inquiry method of social studies instruction by Treatment A will not be significantly more able to use that method than teachers-in-service not taught to use the method.

Symbolically: H_o: $T_A = C$

Legend: T_A = teachers-in-service receiving Treatment A
C = non-treated teachers-in-service

Hypothesis 1b: Teachers-in-service taught to use an inquiry method of social studies instruction by Treatment B will not be significantly more able to use that method than teachers-in-service not taught to use the method.

Symbolically: H_o: $T_B = C$

Legend: T_B = teachers-in-service receiving Treatment B
C = non-treated teachers-in-service

Hypothesis 2: Teachers-in-service taught to use an inquiry method as social studies instruction by Treatment A will not be more able to use the method than teachers-in-service taught to use the method by Treatment B.

Symbolically: H_o: $T_A = T_B$

Legend: T_A = teachers-in-service receiving Treatment A
T_B = teachers-in-service receiving Treatment B

Analysis

Coders recorded their data as a series of numbers which corresponded to the nineteen categories of teacher inquiry behavior set out earlier. These numbers were in turn recorded in a nineteen by nineteen matrix. In order to preserve the sequential relationship between events the numbers were recorded in pairs. The row was used for the

first number (event) and the column for the following number (event). In this manner a matrix was constructed for each teacher observed. There were three groups of teachers, each group consisting of seven teachers. A master matrix was constructed to represent each group. A statistical analysis was made between the groups and the conceptual model of inquiry used in the study. A separated statistical analysis was made among the experimental groups.

The first stage of analysis consisted of a comparison of Treatment Groups A and B and Control Group C to the conceptual model of an inquiry teacher. The usual Chi-square test for closeness of fit was inappropriate for this comparison because the expected frequency of events in four of the categories was zero (0). Chi-square requires a minimum of five events in each category. Similarly, the Fisher Exact Test of Significance[8] was unacceptable due to the presence of zero (0) frequencies.

Treatment Groups A and B and Control Group C were analyzed on the basis of the Inquiry Ratio described below. This ratio represented an exact numerical standard derived from a weighting of the category system which constituted the criterion instrument. The standard consisted of an index number calculated as follows:

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[8] R. Fisher, The Design of Experiments, 6th ed. (New York: Hafner, 1951).

$$\text{Inquiry Ratio} = \frac{\text{Categories } 3+(4-2)+(4-3)+(6-2)}{\text{Categories } (4-1)+5+(6-1)}$$

$$\text{For the Social Studies Teacher} = \frac{10\% + 5\% + 2\% + 3\%}{2\% + 5\% + 3\%} = \frac{20\%}{10\%}$$

$$= 2.0$$

Teachers whose Inquiry Ratio met or exceeded the 2.0 criterion were judged to have exhibited use of the inquiry model within the context of the study. Teachers who approached the 2.0 criterion were evaluated in terms of their relative position.

The second stage of analysis followed procedure established by Flanders.[9] His description of the procedure and the difficulties inherent in such an analysis follows.

> . . . Bales was the first to show that classified events of communication are interdependent. Each event affects the probabilities that a particular event will follow. The basic interdependence of interaction data is present whenever communication events are recorded by an observer in the classroom. As a result, it is inappropriate to test whether two distributions within the ten categories are different by use of Chi-square.
>
> The first qualified statistician to become interested in this problem, as it applied to classroom interaction, was Dr. John H. Darwin, Department of Scientific and Industrial Research, Wellington, New Zealand. It was at his suggestion that our classroom interaction data were collected by a procedure that preserved the original sequence so that sequence pairs could be tabulated in a matrix.

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[9]Flanders, 1966, op. cit.

> Darwin developed a likelihood ratio criterion to test that hypothesis that the frequency distributions in two or more matrices are the same.[10]

The problems encountered by Flanders were also encountered in this study. The nineteen category system used in this study represented an expansion of Flanders' original ten category system. Statistical analysis required a similar expansion of Darwin's criterion. The assumptions on which Darwin based his statistic and the procedure for analysis are described below.

> All of Darwin's analysis is based on the assumption that interaction sequences are one-dependent or Markoff chains which is a much better approximation than the zero-dependent assumption of Chi-square. Communication events are, in fact, more than one-dependent, but the additional dependence of three or more events is small by comparison to the dependence between two events.

An ordinary Chi-square test of significance was thus deemed inappropriate for the comparison of the interaction matrices representing Treatment Groups A and B and Control Group C. The analysis of relationships among these groups followed Darwin's likelihood ratio criterion which provides for the sequential relationship of events observed during classroom interaction. Darwin's procedure is described below:

> Comparing Interaction Matrices.--Given two or more matrices, the null hypothesis concerning the matrix distributions can be tested by a likelihood ratio criterion suggested by Darwin.

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[10] Ibid., p. 35.

$$2[\Sigma n_{jkl}\log_e n_{jkl} - \Sigma n_{j.1}\log_e n_{j.1} - \Sigma n_{jk.}\log_e n_{jk.}$$

(K) (L) (M)

$$+ \Sigma n_{j..}\log_e n_{j..}]$$

(N)

A dot in place of a suffix means that summation has been carried out over the replaced variable.

The procedure for applying the likelihood ratios to test the null hypotheses concerning two matrices A and B, is shown below.

Step One: Prepare a 10 x 10 matrix "A" and the second matrix "B". Check to see that the sum of the corresponding rows and columns within each matrix are equal. An unbalanced matrix may be due to an error in tabulation or due to the fact that the first and last events in the sequence were not identical.

Step Two: Prepare a third matrix "C" which is a combination of A + B. The addition is performed cell by cell, that is,

$$A_{1-1}+B_{1-1},\ A_{1-2}+B_{1-2},\ldots A_{5-5}+B_{5-5},\ldots A_{10-10}+B_{10-10}.$$

Matrix C should also balance and the sums of the corresponding rows and columns should equal the combined sums of the rows and columns in matrix A and B. The check is C = A + B for all cells, row totals and column totals.

Step Three: The first term "K" is found by multiplying each cell frequency by its own natural logarithm ($n \log_e n$), adding these 100 products from A to the 100 products from B, and the sum will then equal the first term K.

Step Four: The second term "L" is found by multiplying each row total by its own natural logarithm, adding the ten products from A to the ten products from B, and the sum will then equal the term L.

Step Five: The third term "M" is found by multiplying each cell frequency in the C matrix by its own natural logarithm, adding the 100 products, and the total will then equal term M.

Step Six: The fourth term "N" is found by multiplying each row total of matric C by its own natural logarithm, adding the ten products, and the total will then equal term N.

Step Seven: The terms are combined as indicated, that is, 2 K - L - M + N. If logarithms to the base ten are used, the formula becomes 4.605 K - L - M + N.

Step Eight: For two 10 x 10 matrices, this criterion has a sampling distribution of Chi-square at 90 degrees of freedom. Since Chi-square approaches a normal distribution for higher degrees of freedom, the above criterion can be converted to a standard score "z" as follows:

$$z = \sqrt{2\ \chi^2} - \sqrt{2n - 1},$$

where n = s(s-1) and s is the number of categories. For two 10 x 10 matrices, this formula becomes

$$z = [2\ \chi^2]^{\frac{1}{2}} - 13.379.$$

When z is 2.58 or larger, the null hypothesis is rejected at the 0.01 level of confidence.

The application of this test to more than two matrices is straight forward. Term K will include the cell by cell addition of all matrices. Term M is calculated from a single, combined matrix in which the cell totals are determined by the addition of frequencies in the corresponding cells of the individual matrices. Term N follows the same procedure with the row totals of the combined matrix. The degrees of freedom ars s(s-1)(r-1); s is the number of categories and r is the number of matrices.[11]

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[11]Flanders, 1966, op. cit.

Summary

Section II described the collection and analysis of data in the study. Four statistical hypotheses were set out to be tested. Each teacher was videotaped teaching a social studies lesson. Trained observers coded the videotapes using the category system described in Section I. The collected data were analyzed in two discrete procedures. Initially, groups were compared to the model of an inquiry teacher through the use of an inquiry ratio derived from a weighting of specific categories within the criterion system used in the study. Subsequently, analysis among groups was completed using Darwin's special case Chi-square procedure. This procedure was used because it acknowledges the sequential relationship of events in an interaction situation. Results of these procedures are reported in Chapter IV.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter presents the findings of the study. Data collected relevant to the experimental hypotheses are analyzed and the findings reported. These data were initially analyzed in relation to an Inquiry Ratio derived from the conceptual model of teacher inquiry behavior. Subsequently, the Darwin likelihood ratio criterion[1] was used to compare experimental groups.

The Inquiry Ratio Comparison

Table 4.1 presents interaction analysis data for Treatment Groups A and B and Control Group C. Included are percentages representing proportion of observed social studies instructional time occupied by each category, expected percentages derived from the conceptual model, and the Inquiry Ratio for each group.

The Inquiry Ratio for the conceptual model of an inquiry teacher was derived through a weighted comparison of categories within the model. Categories 3, 4-2, 4-3, and 6-2 were up-graded categories judged by the researcher

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[1]Darwin, op. cit., p. 412.

TABLE 4.1.--Interaction Analysis Data.

Categories (In Percentages)		Groups			Model
		A	B	C	
1	Accepts Feelings	.31	.07	0.0	0.0
2	Praises	4.38	3.55	3.95	0.0
3	Use of Student's Ideas	20.5	16.8	8.2	10.0
4-1	Asks Narrow Questions	2.56	7.49	8.2	2.0
4-2	Asks Broad Questions	5.3	6.89	3.76	5.0
4-3	Asks Value Questions	.39	.97	0.0	2.0
5	Lectures	3.68	5.15	11.4	5.0
6-1	Commands	1.55	2.7	3.9	3.0
6-2	Suggests	2.5	.97	1.38	3.0
7	Criticizes	1.46	.97	.41	0.0
8-1	Answers Narrow Questions	4.5	9.94	21.18	4.0
8-2	Answers Broad Questions	34.65	34.4	22.6	8.0
8-3	Answers Value Questions	.76	1.14	0.0	4.0
9-1	Student Initiates Idea	3.54	.23	2.01	4.0
9-2	Student Values Expressed	0.0	0.0	0.0	7.0
9-3	Student-Student Discussion	8.61	4.02	1.26	20.0
9-4	Student-Student Values	.19	0.0	0.0	7.0
10-1	Silence	4.69	7.23	7.66	0.0
10-2	Confusion	.06	.87	0.0	0.0

$$\text{Inquiry Ratio} = \frac{\text{Categories } 3+(4-2)+(4-3)+(6-2)}{\text{Categories } (4-1)+5+(6-1)}$$

$$\text{Inquiry Ratio for Model} = \frac{10\% + 5\% + 2\% + 3\%}{2\% + 5\% + 3\%} = \frac{20}{} = 2.0$$

$$\text{Inquiry Ratio for Group A} = \frac{20.5\% + 5.3\% + .39\% + 2.5\%}{2.56\% + 3.68\% + 1.55\%} = \frac{28.72}{7.787} = \underline{3.69}$$

$$\text{Inquiry Ratio for Group B} = \frac{16.8\% + 6.89\% + .97\% + .97\%}{7.49\% + 5.15\% + 2.7\%} = \frac{25.63}{15.34} = \underline{1.67}$$

$$\text{Inquiry Ratio for Group C} = \frac{8.2\% + 3.76\% + 0 + 1.38\%}{8.2\% + 11.4\% + 3.9\%} = \frac{13.34}{23.5} = \underline{0.5677}$$

to be characteristic of an inquiry teacher. Categories 4-1, 5, and 6-1 were down-graded categories judged by the researcher to be antithetical to an inquiry teacher's behavior. The Inquiry Ratio for the conceptual model equaled two (2.0). An Inquiry Ratio of two (2) or greater was accepted as meeting the criterion.

The Inquiry Ratio for the conceptual model of an inquiry teacher equaled two (I.R. =2). Treatment Group A recorded an Inquiry Ratio, I.R. = 3.69. In view of the magnitude of this value, Group A was adjudged as meeting the criterion. Treatment Group B recorded an Inquiry Ratio, I.R. = 1.67. Similarly, this value required Group B to be adjudged as failing to meet the established criterion. Control Group C recorded an Inquiry Ration, I.R. = 0.5677. In view of this value, the decision was to reject Group C as failing to meet the criterion.

Accordingly it was determined that Group A teachers exhibited the behaviors included in the conceptual model of teacher inquiry behavior. Teachers in Group A were acknowledged-inquiry teachers. Teachers in Group B exhibited a tendency toward the use of behaviors defined by the conceptual model of an inquiry teacher; however, they did not perform sufficiently to be acknowledged inquiry teachers.

Teachers in Group C did not demonstrate use of the behaviors defined by the conceptual model of an inquiry teacher and were not accepted as inquiry teachers.

Analysis of Data Related to Hypothesis One

Hypothesis 1: Teachers-in-service taught to use an inquiry method of social studies instruction will not be significantly more able to use that method than teachers-in-service not taught to use the method.

Symbolically: H_o: T = C

Legend: T = treated teachers
C = non-treated teachers.

The data gathered were analyzed using the Darwin likelihood ratio criterion.[2] When z = 2.58 or greater, the null hypothesis is rejected at the .01 level of confidence. Matrices representing Treatment Groups A and B and Control Group C revealed z = 17.616. The value of z = 17.616 would occur one per cent of the time due to chance alone if the null hypothesis were assumed to be true. In view of this obtained value of the Darwin test, the H_o was rejected. Accordingly, teachers-in-service taught to use an inquiry method of social studies instruction were significantly more able to use that method than teachers not taught to use the method.

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[2] Ibid.

TABLE 4.2.--The Darwin Likelihood Ratio Applied to the Frequency Matrices for Treatment Groups A and B, Control Group C and Combined Matrix A+B+C.

	A	B	C	A+B+C
K	16782.8	13839.3	14699.0	45321.1
L	21483.6	18155.1	18810.2	58448.9
M				54824.0
N				68430.7

$X^2 = 2 [K - L - M + N] = 957.8$

$z = 17.616$ Significant

TABLE 4.3.--The Darwin Likelihood Ratio Applied to the Frequency Matrices for Treatment Group A, Control Group C and Combined Matrix A+C.

	A	B	A+C
K	16782.8	14699.0	31481.8
L	21483.6	18810.2	40293.8
M			35266.6
N			44351.3

$X^2 = 2 [K - L - M + N] = 545.4$

$z = 6.877$ Significant

Analysis of Data Related to Hypothesis 1a

Hypothesis 1a: Teachers-in-service taught to use an inquiry method of social studies instruction by Treatment A will not be significantly more able to use that method than teachers-in-service not taught to use the method.

Symbolically: H_o: $T_A = C$

Legend: T_A = teachers receiving Treatment A
C = non-treated teachers

The data gathered were analyzed using the Darwin likelihood ratio criterion. When $z = 2.58$ or greater, the null hypothesis is rejected at the .01 level of confidence. Matrices representing Treatment Group A and Control Group A revealed, $z = 6.877$. The value of $z = 6.877$ would occur one per cent of the time due to chance alone if the null hypothesis were assumed to be true. In view of the value of the Darwin test, the H_o was rejected. Accordingly, teachers-in-service taught to use an inquiry method of social studies instruction by Treatment A were significantly more able to use that method than teachers not taught to use the method.

TABLE 4.4.--The Darwin Likelihood Ratio Applied to the Frequency Matrices for Treatment Group B, Control Group C and Combined Matrix B+C.

	B	C	B+C
K	13839.3	14699.0	28538.3
L	18155.1	18810.2	36965.3
M			32396.5
N			40922.3

$X^2 = 2 [K - L - M + N] = 1802.4$

$z = 33.88998$ Significant

Analysis of Data Related to Hypothesis 1b

Hypothesis 1b: Teachers-in-service taught to use an inquiry method of social studies instruction by Treatment B will not be significantly more able to use that method than teachers-in-service not taught to use the method.

Symbolically: H_o: $T_B = C$

Legend: T_B = teachers receiving Treatment B
C = non-treated teachers

The data gathered were analyzed using the Darwin likelihood ratio criterion. When z = 2.58 or greater, the null hypothesis is rejected at the .01 level of confidence. Matrices representing Treatment Group B and Control Group C revealed z = 33.88998. The value of z = 33.88998 would occur one per cent of the time due to chance alone if the null hypothesis were assumed to be true. In view of the

Darwin test, the H_o was rejected. Accordingly, teachers-in-service taught to use an inquiry method of social studies instruction by Treatment B were significantly more able to use that method than teachers not taught to use the method.

TABLE 4.5.--The Darwin Likelihood Ratio Applied to the Frequency Matrices for Treatment Groups A and B and Combined Matrix A+B.

	A	B	A+B
K	16782.8	13839.3	30622.1
L	21483.6	18155.1	39638.7
M			34713.6
N			44351.3

$X^2 = 2 [K - L - M + N] = 1242.2$

$z = 13.65$ Significant

Analysis of Data Related to Hypothesis Two

Hypothesis 2: Teachers-in-service taught to use an inquiry method of social studies instruction by Treatment A will not be significantly more able to use that method than teachers-in-service taught to use the method by Treatment B.

Symbolically: H_o: $T_A = T_B$

Legend: T_A = teachers receiving Treatment A

T_B = teachers receiving Treatment B

The data gathered were analyzed using the Darwin likelihood ratio criterion. When z = 2.58 or greater, the null hypothesis is rejected at the .01 level of confidence. Matrices representing Treatment Groups A and B revealed, z = 13.65. The value of z = 13.65 would occur one per cent of the time due to chance alone if the null hypothesis were assumed to be true. In view of the Darwin test, the H_o was rejected. Accordingly, teachers-in-service taught to use an inquiry method of social studies instruction by Treatment A were significantly more able to use that method than teachers taught to use the method by Treatment B.

Summary

Chapter IV presented the analysis of data collected and reported the findings of the study. The first stage of analysis consisted of a comparison of the Inquiry Ratios of Treatment Groups A and B and Control Groups C. Treatment Group A was accepted as meeting the criterion. Treatment Group B and Control Group C were rejected as failing to meet the criterion.

The second stage of analysis consisted of the application of the Darwin likelihood ratio criterion to frequency matrices of Treatment Groups A and B and of Control Group C. The analysis among groups was carried out in order to test the two major and two minor hypotheses of the study. All hypotheses were stated in the null form. Each of the four hypotheses were rejected at the .01 level of

confidence. It was concluded that teachers taught to use an inquiry method of instruction were significantly more able to use that method than teachers who had not been taught to use the method. Further, teachers taught by Treatment A were significantly more able to use that method than teachers taught by Treatment B.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

This chapter summarizes the findings and presents the conclusions of the study. The relationship of findings and conclusions to pre- and in-service training of elementary school social studies teachers is discussed. Also included are recommendations for further research.

Summary of the Study

The purpose of this study was to determine whether elementary teachers could be taught to use an inquiry method of social studies instruction. A conceptual model of inquiry-centered teaching was derived from a composite of historical models of inquiry. The model used in this study was correlated with a Flanders' type interaction analysis category system which defined teacher behaviors in an inquiry situation. The researcher then developed two courses of study to train teachers to use the model. Treatment A focused on teacher behaviors during inquiry experiences. Treatment B focused on materials which support inquiry experiences.

An experimental sample was drawn from the elementary teaching staff of the public school system of a midwestern university community. These teachers enrolled in an in-service social studies workshop. Two treatment groups were devised by separating enrollees into Groups A and B. These groups were supplemented by Group C composed of elementary teachers within the school system but not enrolled in the workshop. Groups A and B each received fifteen hours of instruction. Group C received no instruction.

Each of the teachers in Groups A, B, and C was videotaperecorded teaching a twenty minute social studies lesson to elementary children. Trained observers coded the videotapes using the interaction analysis category system defining teacher behavior in an inquiry situation. Frequency data were compiled in matrices for each experimental group and for the control group.

Analysis of these data consisted of two discrete procedures. Each experimental group was compared to the conceptual model of inquiry teaching on the basis of an Inquiry Ratio. Subsequently, the Darwin likelihood ratio criterion was applied to the frequency matrices representing the experimental groups. Experimental hypotheses were supported or rejected on the basis of those findings. These hypotheses stated that no difference would be found in the ability to use an inquiry method of social studies instruction between

teachers taught to use the method and teachers not taught to use the method.

Conclusions

Based on the analysis of data gathered in the study, each of the experimental hypotheses was rejected at the .01 level of confidence. As a result, the following conclusions may be stated:

1. Teachers can be taught to use an inquiry method of social studies instruction derived from historically significant models of inquiry.

2 Teachers can be taught to use an inquiry method of social studies instruction more effectively in a short, in-service workshop focusing on teacher behavior during an inquiry experience than in a similar workshop focusing on materials which support inquiry experiences.

The importance of technique vis-a-vis materials was clearly apparent. In-service teachers who study their own behaviors during inquiry experiences and participate in activities designed to develop inquiry techniques will be able to demonstrate those techniques in their own classroom situations. Teachers who participate in a workshop focusing on materials which support inquiry may exhibit behaviors characteristic of inquiry instruction; however, they will not be as proficient as teachers who have concentrated on behaviors.

Discussion

The conclusions of this study impinge on the areas of pre-service and in-service teacher education. A model of inquiry teaching can be derived from historically significant models of inquiry. Either an undergraduate or graduate social studies methods course may be developed based on such a model. The model may also form the basis of an in-service social studies workshop.

Several limitations influenced the generalizability fo this study's findings. These limitations are stated below.

1. No controls were placed on the experimental sample. The cocperating school district required that all teachers who enrolled in the workshop be accepted.
2. The sample of twenty-one teachers distributed equally in three experimental groups was less than the N = 30 generally recognized as being sufficient for statistical analysis. However, adequate statistical procedures were available to analyze the data gathered and to support inferences about a larger population.
3. The experimenter taught both treatment groups which may have biased the experiment. Ideally each group would have been taught by instructors

unfamiliar with the experimental nature of the workshop or the hypotheses being tested.

4. The participants in this study were employed by the public school system in a midwestern university community and findings are limited to this group.
5. Experimental teachers were observed on one occasion. There is no evidence that they used an inquiry method in other situations.
6. The category system used in this study provided for the quantification of events in the classroom. It did not provide a qualitative evaluation of events. Thus, the fact that a question was asked was recorded but the level of student thinking elicited was not.

The amount of time and resources available to the researcher precluded the extensive, tightly controlled design which would expand the generalizability of results. These limitations were accepted within the context of the researcher's objectives of an exploratory study and resulted in an examination of several specific aspects of inquiry teaching. The findings of the study contribute to knowledge of a topic which has, to date, received little research attention--teacher's ability to use an inquiry method of social studies instruction.

Observation and analysis of the experimental teachers' behavior indicated that they were capable of demonstrating behaviors included in the model of an inquiry teacher used in the study. This did not necessarily mean that they had adopted the method and were, in fact, committed to the idea of inquiry-centered instruction. The tendency was for teachers to use inquiry as a second method rather than as second nature. During observation sessions teachers occasionally slipped into a more expository method of instruction and upon realizing this made a noticeable effort to switch to the inquiry mode. It appears that post-workshop follow-up on an individual basis is necessary to insure continued use of the method, and to increase proficiency.

Questioning emerged as the single most important aspect of the inquiry method. This included the teacher's timing and sequencing of questions as well as the level of questions asked. A review of the activities used during the workshop indicated that participants did not receive sufficient instructional time in the area of questioning to develop the skill necessary for more than the relatively fundamental inquiry experiences. Participants were able to conduct inquiries into low level concepts such as the geographic rationale for the placement of a city, the functional relationship of members of the school community, the role assignments of individuals in the community, or

the interdependence between rural and urban residents. However, the majority were not prepared to deal with higher level concepts such as the relationship of dissent to law and order, the effect of migration on the economy, the function of governmental intervention on the economy, or the role of individual conscience in society. They were particularly unprepared to attack value questions in the classroom.

During observation sessions the teachers failed to exploit opportunities for learning signalled by student's ideas or behaviors due to the inability to ask the right question. Other opportunities were lost when topics were dropped after the initial question was answered. Future workshops should concentrate on these skills. Particular attention needs to be directed to questioning strategies which move a child's consideration from the cognitive to the affective domain of learning. The area of children's attitudes, emotions, and values received minor attention in this study. Pre-service methods of social studies instruction courses might profitably devote a significant component of instructional time to levels of thinking. Undergraduates need to be exposed to questioning skills which enable the teacher to facilitate children's efforts to make the "cognitive leap" from concrete factual knowledge to analysis, synthesis, and evaluation.

Very early in the experiment it became evident that an inquiry method is as much a matter of attitude as technique. Teachers who are reluctant to allow their children to participate in an open classroom dialogue will not adopt an inquiry method of instruction. A great deal of emphasis on teacher attitudes must be included in a workshop designed to promote inquiry. Inquiry techniques consist in large measure of reactions to student's ideas and behaviors. A teacher who has assimilated the elements of an inquiry method into his own teaching style will be better able to use such ideas and behaviors than a teacher for whom inquiry represents a potential threat to classroom control and discipline.

Inquiry is error-full learning. Students do not always arrive at final solutions to the problematic situations encountered. Children must be taught to tolerate the frustrations inherent in such a situation. More importantly, both pre- and in-service teachers need to be conditioned to accept uncertainty as a characteristic of inquiry. They will be more inclined to accept this fact if they have experienced inquiry situations and accept the role of co-learner with their students.

Among the instructional techniques used during the workshop, demonstration teaching seemed most effective. Instructors conducting similar programs may find it effective to teach demonstration lessons in a manner they

hope the students will emulate. Post-lesson analysis of both teacher and student behavior was a vital element of each demonstration lesson. Participants tended to gain substantial insights into the process of inquiry by participating as students in demonstration inquiry experiences.

Similarly, videotaping demonstration lessons and subsequently analyzing them in terms of the model of an inquiry teacher used in the study provided an opportunity to clarify relationships between elements of the model. Sessions in which all members of the group viewed videotapes of themselves teaching were extremely animated and, on the basis of participant's comments, very helpful in developing their ability to use the method.

Use of videotape equipment to record and analyze behavior was of great importance to the study. The obvious value of this technique for the collection of research data was overshadowed by its usefulness as a teaching device. The videotapes made by participants enabled them to carefully analyze, often for the first time, their own teaching style. Although several teachers exhibited pre-taping anxiety, they were uniformly impressed with the results. Several expressed the desire to be taped again after they had had an opportunity to use the inquiry method over a longer period of time.

The videotape technique may be even more useful in pre-service teacher education. There is a strong indication that undergraduates would profit from the opportunity to observe and analyze their teaching techniques prior to entrance into the classroom in a student teaching capacity. Such activities might be included in an undergraduate social studies methods course.

Based on the current study, the researcher would recommend that in-service social studies workshops focusing on inquiry be limited to less than twenty hours of formal classroom instruction followed by individual consultation and/or instruction. Initial attention should be directed to the meaning of inquiry instruction and the participants' perceptions of the inquiry process. As noted above, inquiry is largely a matter of attitude. If these matters are clarified early in the workshop the probability of participant growth will be enhanced.

Instruction should include modeling behaviors in which the instructor teaches demonstration lessons using the inquiry method. Video-taperecordings of these demonstrations should be analyzed by the participants with specific attention to teacher behaviors. During each workshop session questioning techniques should also be demonstrated and examined.

It is further recommended that participants develop inquiry centered materials for use in their own classrooms

and that they be observed using both method and materials in their own classrooms wherever possible. A workshop is most effectively evaluated where participants are observed to determine whether they have learned and/or adopted instructional techniques taught during their participation.

A salient impression of the observation session conducted in the course of this study was that the end of the in-service workshop cannot signal the final step in the treatment participants. If they are to continue to use the desired method of instruction there must be periodic consultations and suggestions from the instructor over an extended period of time. It is not clear how long this period should be.

Recommendations for Further Research

This study constituted an exploratory examination of an in-service program to train teachers to use an inquiry method of social studies instruction. During the course of the workshop questions arose and new problems beyond the scope of this study presented themselves. Many merit the consideration of future researchers.

A number of variables exist which may impinge on a teacher's ability to use an inquiry method of social studies instruction. Among these are sex, age, intelligence quotient, family background, political orientation,

number of years of teaching experience, number of years in current position, social science background, amount of previous instruction in an inquiry method, personal self-concept, level of anxiety, and dogmatism. The types of instructional materials used and the number of students taught may also influence inquiry teaching. Just as there is a lack of research on the topic of teacher acceptance of inquiry as a method of instruction, there is a similar paucity of data regarding students' acceptance of inquiry as a method of learning. The dogmatism, self-concept, anxiety, and family background of a teacher's students may limit his ability to use the method. Due to limitations of time the current study did not control for these variables. However, further research is recommended in which specific controls are made for both teacher and student dogmatism, age, length of service, and self-concept.

Attention might be given to the effect of these variables on the various types of instruction included under the rubric of inquiry in current literature. These include discovery and process as defined earlier in this study.

One variable that is especially worthy of intensive investigation is teachers' ability to use new inquiry-centered social studies materials being marketed commercially. What types of in-service and pre-service training is necessary to maximize the teaching potential of such

materials? Among the promising programs which might be examined in this regard are such inquiry-centered programs as the Contra Costa Social Studies Program,[1] the Our Working World materials,[2] the Minnesota economics materials,[3] as well as new textbook series.

Research on inquiry teaching is needed in three areas: (1) teachers' acceptance of and ability to use an inquiry method of instruction, (2) students' acceptance of and ability to use inquiry as a method of learning, and (3) the relationship between teachers' and students' acceptance of and ability to use inquiry. The current research focused on teacher behaviors, thus, recommendations for further research are primarily concerned with teacher behaviors. Research is recommended in at least five other specific directions.

1. A new and more closely controlled sample of teachers needs to be designed to check the reliability and generalizability of the current study. Such a sample might be treated in a workshop as one element of a year long in-service social studies program in order to test the hypothesis that:

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[1]Taba, op. cit.

[2]Lawrence Senesh, Our Working World (Chicago: Science Research Associates, 1965).

[3]Edith West, director, Report of Minnesota Social Studies Project, Minneapolis: College of Education, University of Minnesota, 1968 (mimeographed).

H1: Teachers taught to use an inquiry method of social studies instruction in an in-service workshop as one element of a year long in-service social studies program will be significantly more able to use that method than teachers taught only in an in-service workshop.

2. Additional researches need to be conducted longitudinally to determine whether teachers taught to use an inquiry method will retain their ability to use the method over time. Such a study might test the hypothesis that:

H2: Teachers taught to use an inquiry method of social studies instruction in an in-service workshop will retain the ability to use that method after two years.

3. The current study did not encompass a qualitative evaluation of questions asked by experimental teachers. It merely noted whether a question was asked. Research is needed which relates the findings of the study to the levels of questions asked and the levels of thinking elicited. Such a study might test the hypothesis that:

H3: Teachers taught to use an inquiry method of social studies instruction in an in-service workshop will ask higher level questions (based on Bloom's Taxonomy of Educational Objectives) than teachers not taught to use an inquiry method of instruction.

4. In order to examine the hypothesis set out in the previous recommendation, a new category system needs to be developed which includes a

finer distinction among levels of teacher questions, student responses, and student initiated ideas and values.

5. Research is needed to correlate the findings of this study with research on creativity. Such research might test the hypothesis that:

H4: Pupils of teachers taught to use an inquiry method of social studies instruction will score higher on tests of creativity than pupils of teachers not taught to use such a method.

Summary

The conclusions, implications, and recommendations for further research based upon the findings of this study were presented in this chapter. Implications for teacher education were discussed. Five different possibilities for research focusing upon the experimental methodology were introduced. Implementation of this experimental methodology could be one means of reducing the gap between expository and inquiry teaching in the classroom.

BIBLIOGRAPHY

BIBLIOGRAPHY

Amidon, Edmund and Hunter, Elizabeth. Improving Teaching. New York: Holt, Rinehart and Winston, Inc., 1967.

Aschner, Mary J. "The Analysis of Verbal Interaction in the Classroom." Theory and Research in Teaching. Edited by Arno A. Ballack. New York: Teachers College, Columbia University, 1963.

Aschner, Mary J, Gallagher, J. J., et al. "A System for Classifying Thought Processes in the Contest of Classroom Verbal Interaction." Institute for Research on Exceptional Children, University of Illinois, 1962. (Mimeographed.)

Ausubel, David P. The Psychology of Meaningful Verbal Learning. New York: Greene and Stratton, 1963.

Bayles, Ernest E. Theory and Practice of Teaching. New York: Harper, 1950.

_____. Democratic Educational Theory. New York: Harper, 1960.

Bellack, Arno A. and Davitz, Joel R. The Language of the Classroom. New York: Cooperative Research Project No. 1497, 1963.

Berlyne, D. E. "Recent Developments in Piaget's Works." British Journal of Educational Psychology, Vol. 27 (157), pp. 1-12.

_____. Conflict, Arousal, and Curiosity. New York: McGraw Hill, 1960.

_____. Structure and Direction in Thinking. New York: John Wiley and Sons, Inc., 1965.

Bruner, Jerome S. "The Act of Discovery." Harvard Educational Review, Vol 31 (1961), pp. 21-32.

_____. The Process of Education. New York: Vintage Books, 1960.

_____. Toward a Theory of Instruction. Cambridge: Belknap Press, 1966.

Clements, Millard. "The Disciplines and Social Study." Effective Thinking in the Social Studies. Edited by Jean Fair and Fannie R. Shaftel. 37th Yearbook. Washington, D. C.: National Council for the Social Studies, 1967.

Craig, Robert C. "Recent Research on Discovery." Educational Leadership, Vol. 26, No. 5 (February, 1969), pp. 501-505.

Darwin, J. H. "Note on the Comparison of Several Realizations of a Markov Chain." Biometrika, Vol. 46 (1959), pp. 412-419.

Davis, Robert B. "Some Remarks on Learning by Discovery." The Madison Project. St. Louis: Webster College, July, 1966.

Dewey, John. How We Think. New York: D. C. Heath, 1933.

Fenton, Edwin M. Teaching the New Social Studies. New York: Holt, Rinehart and Winston, Inc., 1966.

_____. The New Social Studies. New York: Holt, Rinehart and Winston, Inc., 1967.

Fiegl, Herbert. "Concepts and the Structure of Knowledge." Concepts and Structure in the New Social Science Curricula. Edited by Irving Morrissett. A Report of a Conference at Purdue University, January 29-30, 1966, sponsored by the Social Science Education Consortium, West Lafayette, Indiana, pp. 11-20.

Fisher, R. The Design of Experiments. 6th ed. New York: Hafner, 1951.

Flanders, Ned A. Teacher Influence, Pupil Attitudes and Achievement: Studies in Interaction Analysis. Minneapolis: Cooperative Research Project No. 397, 1960.

_____, director. Helping Teachers Change Their Behavior. U.S.O.E. Project 1721012. Ann Arbor: University of Michigan, April, 1963.

_____. Interaction Analysis in the Classroom: A Manual for Observers. Ann Arbor: University of Michigan School of Education, 1966.

Ford, G. W. and Pugno, Lawrence. The Structure of Knowledge and the Curriculum. Chicago: Rand McNally, 1964.

Fox, Robert S., Lippitt, Ronald, and Lohman, John. Teaching of Social Science Material in the Elementary School. USOE Cooperative Research Project E-011. Ann Arbor: University of Michigan, 1964.

Gagne, Robert M. "Varieties of Learning and the Concept of Discovery." Learning By Discovery--A Critical Appraisal. Edited by Lee S. Shulman and Evan R. Keislar. Chicago: Rand McNally, 1966.

Gallagher, James J. Analysis of Research on the Education of Gifted Children. Springfield: State of Illinois, Office of the Superintendent of Public Instruction, 1960.

Goldmark, Bernice. Social Studies: A Method of Inquiry. Belmont, California: Wadsworth Publishing Co., Inc., 1968.

Griffin, A. F. "A Philosophical Approach to the Subject-Matter Preparation of Teachers of History." Unpublished Ph.D. dissertation, Ohio State University, 1942.

Hendrix, Gertrude. "Learning By Discovery." Mathematics Teacher, Vol. 54 (1961), pp. 290-299.

Hullfish, H. Gordon, and Smith, Phillip. Reflective Thinking: The Method of Education. New York: Dodd, Mead and Co., Inc., 1961.

Hunt, Maurice P. and Metcalf, Lawrence E. Teaching High School Social Studies. New York: Harper and Row, Publishers, 1955.

Inhelder, Barbel and Piaget, Jean. The Growth of Logical Thinking: From Childhood to Adolescence. New York: Basic Books, Inc., 1958.

Kersh, Bert Y. Directed Discovery vs. Programmed Instruction. Final Report, NDEA Title VII, Project No. 907. Monmouth: Oregon State System of Higher Education, 1964.

_____. "Learning by Discovery: What is Learned?" The Arithmetic Teacher, Vol. 11, No. 4 (April, 1964), pp. 226-231.

Martin, William Oliver. "The Structure of Knowledge in the Social Sciences." Education and the Structure of Knowledge. Edited by Stanley Elam. 5th Annual PDK Symposium on Educational Research. Chicago: Rand McNally and Co., 1964.

Massialas, Byron G. and Cox, C. Benjamin. Inquiry in Social Studies. New York: McGraw Hill Book Co., 1966.

Massialas, Byron G. and Zevin, Jack. Creative Encounters in the Classroom: Teaching and Learning Through Discovery. New York: John Wiley and Sons, Inc., 1967.

Medley, Donald M. and Metzel, Harold E. "Measuring Classroom Behavior by Stytematic Observation." Handbook of Research on Teaching. Edited by N. L. Gage. Chicago: Rand McNally and Co., 1963.

Metcalf, Lawrence E. "Research on Teaching the Social Studies." Handbook of Research on Teaching. Edited by N. L. Gage. Chicago: Rand McNally and Co., 1963.

Parker, J. Cecil and Rubin, Louis J. Process as Content: Curriculum Design and the Application of Knowledge. Chicago: Rand McNally and Co., 1966.

Roughead, W. G., and Scandura, J. M. "What Is Learned in Mathematics Discovery." Journal of Educational Psychology, Vol. 59 (1968), pp. 283-289.

Schwab, Joseph J. The Teaching of Science. Cambridge: Harvard University Press, 1962.

_____, supervisor. Biology Teachers' Handbook. New York: Wiley and Sons, 1963.

_____. "Problems, Topics and Issues." Education and the Structure of Knowledge. Edited by Stanley Elam. 5th Annual Symposium on Educational Research. Chicago: Rand McNally and Co., 1964).

Senesh, Lawrence. Our Working World. Chicago: Science Research Associates, 1965.

_____. "Organizing a Curriculum Around Social Science." Concepts and Structure in the New Social Studies Curricula. Edited by Irving Morrissett. A Report of a Conference at Purdue University, January 29-30, 1966. Sponsored by the Social Science Education Consortium, West Lafayette, Indiana.

Shulman, Lee S., and Keislar, Evan R. eds. Learning by Discovery: A Critical Appriasal. Chicago: Rand McNally, 1966.

Shulman, Lee S., Loupe, Michael J., and Piper, Richard M. Studies of the Inquiry Process. East Lansing: Educational Publication Services, College of Education, Michigan State University, RR-22, 1968.

Sigel, Irving E. and Hooper, Frank H. Logical Thinking in Children. New York: Holt, Rinehart and Winston, Inc., 1968.

Simon, Anita, et al. "Programing Teacher-Pupil Interaction Patterns." Paper delivered at the American Educational Research Association, Chicago, February, 1966.

Soar, Robert S. "Optimum Teacher-Pupil Interaction for Pupil Growth." Educational Leadership/Research Supplement, Vol. 2, No. 3 (December, 1968), pp. 275-280.

Suchman, J. R. Training Children in Scientific Inquiry. Urbana: University of Illinois, College of Education, 1959.

_____. "Inquiry Training: Building Skills for Autonomous Discovery." Merrill-Palmer Quarterly of Behavioral Development, Vol. 7 (1961, pp. 148-169.

Taba, Hilda and Hills, James. Teacher Handbook for Contra Costa Social Studies, Grades 1-6. Hayward, California: Rapid Printers and Lithographers, 1965.

Trezise, Robert L. "Reflective Teaching." Michigan Educational Journal, February, 1964, p. 18.

West, Edith, director. Report of Minnesota Social Studies Project. Minneapolis, College of Education, University of Minnesota, 1968. (Mimeographed.)

Worther, B. R. "Discovery and Expository Task Presentation in Elementary Mathematics." Journal of Educational Psychology. Monograph. Supplement 59:1, Part 2, 1968.

Zevin, Jack. Personal correspondence, December 5, 1968.

APPENDIX

CATEGORIES FOR THE ANALYSIS OF TEACHER

BEHAVIOR IN AN INQUIRY METHOD

A. TEACHER BEHAVIOR

1. Accepts feelings: accepts and clarifies the feeling tone of the student in a non-threatening manner. Feelings may be positive or negative. The teacher includes the emotional state of the student into a verbal statement.

2. Praises or encourages: teacher praises or encourage student's action or verbal behavior. Jokes that release tension, but not at the expense of another individual; nodding the head; saying 'uh huh' or 'go on' are included in this category.

3. Uses student's statements or behavior: The teacher repeats the student's statement, rephrases the content of a statement, or reports the behavior that has been performed by the student.

   The student's question is answered by the teacher.

   The teacher asks the student a question based on the student's statement.

   The teacher uses the student's statement to develop his own statement. The teacher would generally be clarifying or elaborating the student's ideas or would be developing a question based on his idea.

4. Asks Questions

   1. Narrow non-normative: The question has only one acceptable or correct response. The teacher's purpose is usually to elicit factual information. This involves a recitation type activity in which the teacher has a single "right" answer or answers in mind. This category coincides with the first category, "knowledge," in Bloom's taxonomy. An example of this type of question would be, "What were the main provisions of the Treaty of Versailles?"

2. Broad non-normative: The question has two or more acceptable or correct responses. The questions are thought-provoking or require expression of a non-normative nature. By broad-non-normative is meant statements or expressions which involve cognitive operations of a higher order than that of simple factual recall, i.e., the "knowledge" category in Bloom's taxonomy. This category would include the higher orders: "application, analysis, synthesis, and evaluation." An example of this type of question would be, "What factors do you think influence the location of a big city?"

3. Normative: The question has two or more acceptable responses that must invoke the expression of value statements. By value statements is meant ideas, beliefs and opinions which have a moral or ethical intent. Such statements must incorporate problems or questions of good and evil, right and wrong. An example of this could be, "Is war right or wrong?" or Is it good for this situation to exist in our country?"

5. Lecturing: The teacher states facts or opinions about content or procedures, expresses ideas of his or her own, or asks rhetorical questions.

6. Giving directions

   1. Commands: The teacher gives commands and orders to which compliance is expected or explains directions about how something is to be done.

   2. Suggests: Provides alternatives, reasons, or invites students to help decide what must be done next.

7. Criticizing or justifying authority: Teachers' statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he or she is doing; extreme self-reference.

B. STUDENT BEHAVIOR

8. Responses

   1. Narrow non-normative: The student answers the teacher's question with a single, narrow, factual

response as part of a recitation. This includes specific factual questions.

2. Broad non-normative: The student answers the teacher's question with a broad idea, concept or generalization not involving reference to values.

3. Broad normative: Student answers teacher's question with a normative response such as a statement of value, belief, feeling or opinion based on moral considerations.

9. Initiation

1. Student-teacher non-normative: Student initiates non-normative statements based on his or her own ideas and thinking. This means that the student adds to the discussion by presenting new information, evidence, questions and responses.

2. Student-teacher normative: Student initiates statements of a normative nature involving questions of right or wrong, good or evil, based on the student's own feeling and values.

3. Student-student non-normative: Student initiates a non-normative statement or question to another student.

4. Student-student normative: Student initiates a normative response or question to another student.

10. Silence: a period of no communication.

1. Fragmented but relevant discussion: Fragmented but relevant conversation including more than one pair of speakers discussing the previous communication. May involve multiple speakers in large groups.

2. Irrelevant and disorganized conversation and behavior, lack of discipline: Irrelevant non-productive remarks such as jokes, disruptive statements, unacceptable actions, or shifts to other subjects. An example of this might be the following interchange of expression.

"Q: What did Woodrow Wilson do after World War I?"
"A: He ate a peanut butter sandwich."

This category system is based on that of Ned Flander's original system as set forth in Interaction Analysis in the Classroom, Revised Edition, 1966. The subscripting was adapted by Lee H. Ehman and Jack Zevin from that of Flander's 21-subscript system and Larry Gess' later modification of this work and is used here with their permission.