THE EFFECTS OF SIMULATIONS ON THE DEVELOPMENT OF QUESTIONING BEHAVIOR OF STUDENTS

A Dissertation

Presented to

the Faculty of the College of Education

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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by

David Allen Kernwein

May 1979

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ABSTRACT

It was the purpose of this study to determine the effects of simulations on student questioning behavior. In order to determine these effects answers were sought to the following questions: (1) Do simulations produce an increased percentage of higher-level questions asked by students? (2) Do simulations produce an increase in the total number of questions asked by students?

The research design used in the study was the Time-Series design. The study lasted ten weeks and during this time period ten geographic concepts were presented to thirty-three ninth-grade students at Anderson High School in Austin, Texas. Each concept was presented for a period of one week and was examined by either expository teaching methods or simulations. During eight of the ten weeks expository methods were used for instruction. During weeks five and seven simulations were used as the instructional methods.

A total of 1,731 student questions were recorded during the course of the study. These questions were placed in random sequence and distributed to a committee of three social studies educators to classify as to the taxonomical level of each question. The levels were based on the levels of questions as defined by Norris M. Sanders in Classroom Questions--What Kinds?

During each week the total number of questions asked daily at each level was recorded. Cumulative totals were also determined for each week. All questions asked during expository weeks were compared with questions asked during simulation weeks. This was to determine and identify percentage differences and patterns that were observable during the course of the study regarding total numbers of questions asked and number of questions asked at each taxonomical level.

The data, when analyzed, led to the following conclusions:

(1) From levels four through seven (application, analysis, synthesis, and evaluation) expository instruction produced an increased percentage only at the application level. On the average, 4.2 percent of all questions asked during expository

sessions were at the application level with less than 1 percent occurring during simulations. The analysis level indicated a 7 percent increase during simulation activities while the synthesis level indicated a 1.2 percent increase. At the evaluation level simulations also showed a slight increase of 0.1 percent.

(2) The data also indicated that more total questions were asked during simulation activities. During weeks five and seven, 258 and 361 total questions were asked, respectively. These numbers represented an increase of eighty-two more questions asked during week five and 185 during week seven compared to the highest number asked during any expository week.

(3) The data also indicated that during simulations there was a sharp decline in the number of classroom procedural questions. The difference was an average of 16 percent more procedural questions asked during expository classes. As a result of this decline in procedural questions, 16 percent more questions were asked which focused on course content and geographical data during simulations.

(4) During simulation activities (weeks) students asked a much higher percentage of analysis questions when compared to expository weeks. The total of analysis questions more than doubled when compared to the highest number of analysis questions asked during any expository week. This indicated a relationship of some type may exist between simulation activities and analysis level questions.

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CHAPTER I

NATURE OF THE STUDY

Introduction

Active student involvement in the teaching-learning process was considered to be essential if education was to be meaningful. According to Rothkopf, activities of the student determined, to a large degree, what was learned in most instructional settings.[1] Also, Anderson supported the idea that the activities a student engaged in when confronted by an instructional task were of critical importance in determining what was to be learned.[2] An essential element of student involvement was the questioning behavior of students, since such behavior might be indicative of an ability to analyze problems. Hunkins stated "In most instructional situations,

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[1]Ernst Rothkopf, "The Concept of Mathemagenic Activities," Review of Educational Research 40 (1970): 325-336.

[2]C. R. Anderson, "Control of Students' Mediating Process during Verbal Learning and Instruction," Review of Educational Research 40 (1970): 349-369.

what is learned depends largely on the activities and questions of the students."[3] He further added, "The question is perhaps the primary tool by which the individual processes information regardless of the diversity of his procedures."[4] Student questioning behavior was related to effective analysis of problems. As student levels of questioning increased (levels based on the Taxonomy of Educational Objectives), they were better able to analyze personal and social problems.[5] (Hereafter, the Taxonomy of Educational Objectives will be referred to as the taxonomy.)

It was using the taxonomy as a framework that student questions were analyzed and classified for study purposes. The authors of the taxonomy stated that their categories were sequential and cumulative. In other words, each category of thinking had unique elements but also included some form of all lower categories. Therefore, according to Sanders, who had applied the taxonomy to the study of questioning behavior, "A question should

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[3]Francis P. Hunkins, Involving Students in Questioning (Boston: Allyn and Bacon, 1976), p. 4.

[4]Ibid., p. 4.

[5]Donald Scovel, A Study Analyzing High School Student Questioning Behavior in American History Classes (Doctoral Dissertation, University of Iowa, 1968).

be classified at its highest level."[6] This indicated that a question may have been related to certain thinking processes which included all levels of thinking prior to the actual level of classification. Therefore, questions which were asked at a specific level included the thinking processes involved in all previous levels of questioning.

Simulations in the social studies appeared to foster student activity and involvement and hence had considerable potential in the development of higher order questioning behavior on the part of students. When simulations were utilized as main activities in the regular curricular scope and sequence, student participation increased.[7] For the most part, positive attitudinal changes were also observed during simulation activities.[8] Yet there remained a need to explore the impact of simulation

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[6]Norris M. Sanders, Classroom Questions--What Kinds? (New York: Harper and Row, 1966).

[7]Cleo Cherryholmes, "Some Current Research on Effectiveness of Educational Simulations: Implications for Alternative Strategies," American Behavioral Scientist 10 (October 1966): 4-7.

[8]Karen Cohen, Effects of a Consumer Game on Learning and Attitudes of Selected Seventh Grade Students in a Target Area School, report 65 (Baltimore, Md.: Center for the Social Organization of Schools, Johns Hopkins University, 1970).

type activities on the various kinds of student involvement. Specifically, there was a need to investigate the relationship between the utilization of simulations and questioning behavior on the part of students.

Purpose of the Study

The purpose of this study was to determine the effects of simulations on student questioning behavior.

Procedure

The data gathered in the study were student questions recorded in class. After all questions had been recorded a committee of three social studies educators who were familiar with Norris Sanders' classification system classified all questions.

The following limitations applied to this study:

(1) The study was limited to one class of approximately thirty-five students.

(2) The study was limited to ninth-grade students enrolled in a course focusing on urban geographic concepts.

(3) The study was limited to ten weeks of observation and data gathering in the Austin Independent School District (Austin, Texas).

Definition of Terms

In the context of this study these terms have the following meanings:

Levels of Questioning. This referred to the categories of higher order questioning as identified by Norris M. Sanders (1966) in Classroom Questions--What Kinds? (see Appendix A for various levels).

Questioning Behavior. This referred to questions formulated and asked by students within the framework of class instruction during the course of the study.

Simulation. This referred to a working model of an object or goal that exists in the real world and can be utilized in the classroom as an instructional tool.

Games. Activities with specific goals and structure that may or may not refer to the real world and did not create role-playing situations.

Time-Series. This referred to the time-series experimental design as defined by Campbell and Stanley.[9] The procedure is defined in detail in the section of the study focusing on procedures and methodology.

Expository Teaching Methods. Expository teaching methods as it was used in the context of this study referred to classroom instruction that was teacher centered, utilizing the lecture as the primary instructional tool. While class discussion was considered within the purview of expository methods, the focus of instruction was on the lecture method. Approximately 80-90 percent of instructional time was via the lecture method, with the remaining time devoted to discussion or the use of audio-visual aids in the classroom.

Introduction of Treatment. This referred to the use of simulation activities introduced during the fifth and eighth weeks of instruction to identify a shift in the questioning patterns of students. This will be reviewed in greater detail in the section dealing with procedures and methodology.

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[9]Donald Campbell and J. C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally Co., 1963).

Procedural Questions. In the context of this study procedural questions referred to student questions which were asked to clarify some aspect of classroom business. The questions were asked to clarify or explain some aspect of classroom activity not directly related to subject matter being studied.

Knowledge Questions. Knowledge questions were questions asked by students, when focused on subject matter. These were questions related to geographic concepts presented and studied in class and dealing with course content.

Higher Level Questions. In the context of this study higher level questions were those knowledge questions classified at the application, analysis, synthesis and evaluation levels.

History. In this study history referred to a threat to validity as defined by Campbell and Stanley. When the discipline of History was referred to it was specifically stated.

Hypotheses Tested in the Study

The following two hypotheses were tested in the study. Results will be discussed in Chapter IV.

Hypothesis 1: The introduction of simulations, as treatments in a time-series sequence of expository teaching procedures, will produce an increased percentage of higher-level questions asked by students.

Hypothesis 2: The introduction of simulations, as treatments in a time-series sequence of expository teaching procedures, will produce an increase in the total number of questions asked by students.

CHAPTER II

REVIEW OF RELATED LITERATURE

Chapter II contains a review of literature specifically related to this study. The two primary areas of research that have been reviewed focus on simulations, student questioning behavior, and teacher questioning behavior.

Research Pertaining to Simulations

Prior to 1962 social scientists were aware of simulations as instructional techniques but little research of consequence had taken place. This lack of comprehensive statistical validation was noted as early as 1962.[1] Between 1963 and 1966 there were some initial studies exploring the effectiveness of simulations versus other teaching methods.[2] One of the first simulations developed and researched at a major institution was the

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[1]P. Greenlaw, L. Herron, and R. H. Lawson, Business Simulation (Englewood Cliffs, N.J.: Prentice-Hall, 1962).

[2]James Robinson, Lee Anderson, Margaret Herman, and Richard Snyder, "Teaching with Inter-Nation Simulations and Case Studies," American Political Science Review 60 (1968): 53-60.

simulation "Experimentation," dealing with presidential election campaigns. It was developed at Johns Hopkins University. Many of the findings were conflicting and difficult to interpret.[3] For example, some students demonstrated positive attitudes and some negative attitudes during the simulation. There was also some conflict and confusion as to what distinguished a good game from a bad one.[4] In 1966 a clear and concise summary of findings was published for the first time.[5] The conclusions of this report were that simulations did motivate, but there was not substantial evidence that they taught facts or problem-solving skills or induced critical thinking any more effectively than any other method.

Following this 1966 report the research in simulations increased rapidly. Like previous studies the

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[3]Sarane S. Boocock, Effects of Election Campaign Game in Four High School Classes, Baltimore, 1963. (Mimeographed.)

[4]H. Thorelli and R. L. Graves, International Operations Simulation (New York: Free Press, 1964).

[5]Cleo Cherryholmes, "Some Current Research on Effectiveness of Educational Simulations: Implications for Alternative Strategies," American Behavioral Scientist 10 (October 1966): 4-7.

newer efforts focused on the effects of simulations on student acquisition of factual knowledge; however, a major thrust of the newer studies was in the area of attitudinal changes. There appeared to be some discrepancy in the research regarding the teaching of factual knowledge. An initial study in 1970 claimed increased performances of simulation groups over control groups,[6] and some follow-up studies supported this position.[7] However, other studies reported no significant increases by either the control or the experimental groups.[8,9] One pertinent study supporting this position concluded that simulations appeared to be as effective as, but not

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[6]Karen Cohen, Effects of a Consumer Game on Learning and Attitudes of Selected Seventh Grade Students in a Target Area School, report 65 (Baltimore, Md.: Center for the Social Organization of Schools, Johns Hopkins University, 1970).

[7]Samuel A. Livingston, Simulation Games and Attitudes toward the Poor: Three Questionnaire Studies, report 118 (Baltimore, Md.: Center for the Social Organization of Schools, Johns Hopkins University, 1971). ED 057 612.

[8]C. R. Anderson, "An Experiment on Behavioral Learning in a Consumer Credit Game," American Education Research Journal 9 (1970): 385-90.

[9]O. A. Heinkel, "Evaluation of a Simulation as a Teaching Device," Journal of Experimental Education 38 (1970): 32-36.

superior to, other general instructional systems regarding cognitive growth. Still other studies reported opposite findings. The results of these studies indicated that more factual knowledge was learned by students in control groups receiving lectures as sources of information.[10] In another detailed and comprehensive study regarding factual knowledge, it was demonstrated that simulations may produce delayed effects.[11] For example, students were able to retain and recall factual knowledge weeks after participation in the simulation.

Findings regarding simulations and attitudinal change are more consistent. One study focused on the effects simulations have on both attitude and personality and how simulations may produce attitudinal changes,[12]

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[10]Dale M. Garvey and William H. Seiler, "A Study of the Effectiveness of Different Methods of Teaching International Relations to High School Students," Emporia, Kans., 1966.

[11]T. E. Keach and David A. Pierfy, The Effects of a Simulation on Learning of Geographic Information at the Fifth Grade Level--Final Report (Athens, Ga.: Department of Social Science Education, University of Georgia, 1972). ED 068 889.

[12]Robert S. Lee and Arlene O'Leary, "Attitude and Personality Effects of a Three Day Simulation," Simulation and Games 2 (1969): 309-347.

while another detailed report on simulations and attitudinal changes regarding the poor was completed at Johns Hopkins University.[13] Some simulations were found to increase levels of pessimism about the topic and people in general, as discovered with the use of the simulation "Ghetto."[14] Still other research in the attitudinal area found that simulations did influence attitudes toward racism and sexism.[15] Boys were found to express more positive attitudes than girls in a hunting simulation and this appeared related to appropriate attitudes involving sex-linked behavior.[16] Initial studies dealing with attitudes and group behavior found that, in group activities, where the simulation developed smoothly and

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[13]Samuel A. Livingston, Simulation Games and Attitude Change: Attitudes toward the Poor, report 63 (Baltimore, Md.: Center for Social Organization of Schools, Johns Hopkins University, 1970). ED 039-151.

[14]Steven J. Kridder and Horace Aubertine, Attitude Change and the Number of Plays of a Social Simulation Game, report 145 (Baltimore, Md.: Center for the Social Organization of Schools, Johns Hopkins University, 1972). ED 072-392.

[15]Thomas H. Chapman, Simulation Game Effects on Attitudes Regarding Racism and Sexism (Doctoral dissertation, University of Maryland, 1974).

[16]Jerry L. Fletcher, "Evaluation of Learning in Two Social Simulation Games," Simulation and Games 2 (1971): 259-86.

interestingly, initial attitudes of the players had almost no influence on the way they felt at the end of the simulation. The conclusion was that the process of learning is mediated by the general atmosphere of the group.[17] A final focus of attitudinal research has been to examine the overall impact of simulations on attitudinal changes. Most findings support the position regarding attitudinal changes that simulations do have an impact on, and cause shifts in, attitudes of students.[18]

In the area of student motivation, simulations may stimulate interest that other methods have failed to develop. For example, simulations have increased attendance in inner-city schools.[19] This was also found to be true at the college level.[20] It has also been found that

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[17]Michael Inbar, "Individual and Group Effects on Enjoyment and Learning in a Game Simulating a Community Disaster," eds. Boocock and Schilds, Simulation Games in Learning (Beverly Hills, Calif.: Sage Publications, Inc., 1968).

[18]James H. Coats, A Comparative Study of the Effects of Simulations and Traditional Teaching on Student Achievement, Attitude, Motivation and Interpersonal Relations in Eleventh Grade American History (Doctoral dissertation, Auburn University, 1970).

[19]Cohen.

[20]Robinson, et al.

simulations may have positive effects on students' self-confidence.[21]

Simulations also appear to provide special opportunities for low-ability and low-achieving students by helping to create a positive attitude toward school and learning.[22] Students with low grade point averages tend to outscore students with higher averages when using simulations.[23]

The general research conclusions regarding simulations as of 1979 are: (1) that simulations appear to be about as effective as conventional teaching methods when factual knowledge is the focus of instruction; (2) students seem to prefer the use of simulations to traditional methods of instruction in the class; (3) the real significance and impact of simulations may be in the

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[21]Keith J. Edwards, The Effects of Ability, Achievement, and Number of Plays on Learning from a Simulation Game, report 115 (Baltimore, Md.: Center for the Social Organization of Schools, Johns Hopkins University, 1970).

[22]Sarane S. Boocock and E. O. Schild, Simulation Games in Learning (Beverly Hills, Calif.: Sage Publication, Inc., 1968).

[23]Larry A. Braskamp and Richard Hodgetts, "The Role of Objective Evaluation Model in Simulation Gaming," Simulation and Games 2 (1971): 197-212.

attitudinal rather than cognitive areas; and (4) students of low academic ability or low achievement seem to do much better at learning to play or take part in simulation-type activities than at learning from them and being able to transfer their learning to the real situation.

Research Pertaining to Teacher and Student Questioning Behavior

A second major area of research that will be reviewed is that of questioning behavior. A common trend in the research since the 1930s has been the analysis of and description of teacher questions and teacher questioning behavior.[24] A limited amount of research has focused on student questioning and this has only been in the 1970s. The major thrust of questioning research has, therefore, centered on teacher rather than student. A review of pertinent studies follows.

Research in the area of teacher questioning has concentrated in the areas of higher order questioning as well as the complexity of the questions asked. With regard to higher order questioning, one study showed no

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[24]M. D. Gall, "The Use of Questions in Teaching," Review of Educational Research 40 (1974): 707-772.

significant differences in examination scores when social studies students were measured as to the impact of various levels of questioning by teachers.[25] Another study showed that a treatment in the form of prior instruction dealing with high-level questions was found to be significantly more effective than other treatments lacking the instruction.[26] One of the more significant research reviews pertaining to teacher questions has concluded that the frequency of factual single-answer questions correlated positively and significantly with achievement, whereas the frequency of more complex, difficult, or divergent questions has negative correlations.[27]

Other areas of research regarding teacher questioning have focused on teacher-student interaction and

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[25]D. D. Hearn, The Effects of Questions in Facilitating Fourth-Grade Pupils' Acquisition of Information from Printed Instruction Materials in Social Studies (Doctoral dissertation, The University of Texas at Austin, 1969).

[26]W. M. Kniep, A Study of the Effects on Social Studies Achievement of High Level Questions with Conditions of Prior Training and Positive Reinforcement (Doctoral dissertation, University of Minnesota, 1974).

[27]B. Rosenshine, "Recent Research on Teaching Behavior and Student Achievement," Journal of Teacher Education 27 (1976): 61-64.

on wait time. In the area of questioning patterns and teacher-student interaction it was found that interaction and questioning may be related to teacher expectations of high or low achievement.[28] Research has also focused on the relationship between question, students' answers and "wait time." It has been found that wait time is generally about one second and as it expands so do student answers.[29]

With regard to research in student questioning, there are several studies that are pertinent to this study. In the area of levels of questioning, one study focusing on student questions concluded that through instruction on the Taxonomy the levels of questions asked by students can be raised, and it was reported that this type of instruction could help students more effectively analyze social problems.[30] In a study examining the relationship

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[28]J. T. Jeter, Elementary Social Studies Teachers' Differential Classroom Behavior with Children as a Function of Differential Expectations of Pupil Achievement (Doctoral dissertation, The University of Texas at Austin, 1972).

[29]M. B. Rowe, "Science, Silence and Sanctions," Science and Children, March 1969, pp. 11-14.

[30]Donald Scovel, A Study Analyzing High School Student Questioning Behavior in American History Classes (Doctoral dissertation, University of Iowa, 1968).

between teacher and student levels of cognitive questioning, it was found that no relationship could be identified between teacher- and student-level questions.[31]

In a 1974 study focusing on geography and questioning behavior, it was reported that students given instruction in asking higher-level questions scored higher on examinations than did students not receiving instruction.[32] Carin and Sund state that in situations where students are encouraged to develop and ask their own questions, higher levels of thinking could result along with increased group cooperation.[33]

In another study involving questioning levels, 4,528 questions of students were examined. The study took place in the St. Louis County school system. The content area was social studies and the study sought to answer several questions regarding student growth and levels and numbers of questions asked. The results

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[31]Barbara Boyd Hoskins, The Relationship of the Level of Cognitive Questions used by Teachers to the Level of Cognitive Questions Posed by Children (Doctoral dissertation, Southern Illinois University, 1973).

[32]Kniep.

[33]A. Carin and R. Sund, Developing Questioning Techniques, A Self-Concept Approach (Columbus, Ohio: Charles E. Merrill Books, Inc., 1971).

indicated that no relationship existed between numbers of questions asked and growth as measured by gains in pretest-posttest scores.[34] Students in the lowest third of the class did show the greatest amount of growth. Another conclusion was no relationship existed between the level of questions asked and growth. However, there was a strong relationship that approached significance between analysis questions and growth. It was also found that a high correlation exists between IQ and the number of questions asked.

In a study focusing on student questions and how these questions relate to the thinking processes of children, it was concluded that questions asked by students can be utilized as a way of providing the "match" between the child's level of thinking and substantive meanings.[35] This was concluded as meaning that the child's questions offer a means of dealing with his thought at its existing level while at the same time

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[34]Mary Francis Pritchard, Children's Clasroom Questions--How Many? What Kind? Their Effects on Individual Growth (Doctoral dissertation, St. Louis University, 1969).

[35]Miriam Dorn, A Study of the Questions Asked by Kindergarten Children (Doctoral dissertation, Columbia University, 1966).

advancing the child's thought processes. Research has also concluded that student interest increases when student questions are used as a base for investigation.[36]

Research has also been centered on the relationship between questioning and examination scores. In the early 1970s the Stanford Research Institute at Menlo Park, California conducted a number of studies examining the relationship between student qeustions and achievement. The studies concluded that an increase in questions asked by children correlated positively to higher scores on both achievement tests and attitudinal tests.[37]

The general research conclusions regarding teacher-student questioning behavior as of 1979 are: (1) when students are made aware of, and given instruction in, asking higher-level questions, the questioning level will increase, (2) an increase in the number of questions asked by students is correlated positively to scores on both achievement tests and attitudinal tests, (3) levels

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[36]Lonnie Kellenberger, Student Question Asking Behavior in Grade Six Social Studies (Doctoral dissertation, University of Oregon, 1971).

[37]Jane A. Slatlings and Phillip Giesen, A Study of Reliability in Observational Data (Menlo Park, Calif.: Stanford Research Institute, 1974).

and types of questions by teachers may aid students in raising test scores but have not been proven to consistently do so, (4) students asking higher-level questions tend to score higher on examinations.

In terms of the above reported research regarding (1) simulations and (2) questioning behavior, there is a lack of research in the area of student questioning behavior and the impact of simulation-type activities. In other words, there is no reported research showing any relationship between the development of simulation activities and the kinds of questions students may ask as a result of their involvement in such activities. Do simulations stimulate students to ask higher-level questions? Do the students take a more inquirying stance during simulation activities? It would appear that answers to the above questions could add significantly to the quest for knowledge in the areas of the effects of simulation activities and questioning behavior.

CHAPTER III

PROCEDURES AND THE EXPERIMENTAL DESIGN

Population

The population used in the study was a ninth-grade social studies class in the Austin Independent School District (Austin, Texas). One geography class was the focus of the study at Anderson High School. All students in the class were randomly assigned to the class by the central computing system of the Austin school district. The composition of the class therefore represented a cross-section of students that live in the district in general and the school community in particular.

Although the student body of the school consists predominately of middle- and upper-middle-class students from North and Northwest Austin, a portion of the student body is bused to the school from other areas of the city, especially the predominantly black East Austin area. This factor added a variety of students from various ethnic and cultural backgrounds to the sample group.

A detailed breakdown of the sample group follows. A total of 33 students took part in the study of

this group. There were 20 female students and 14 males. The breakdown of the females in the class into ethnic groups consisted of 13 Caucasians, 5 Blacks, 1 Oriental, and 1 Chicano. The male breakdown showed 2 Blacks and 11 aucasians in the sample group. All students were randomly assigned and represented students with grade point averages from below 2.0 to 3.8. The average age of the students in the sample group was 14 years and 2 months. All students were in the ninth grade.

The Research Design

The research design that was utilized by this study was the time-series deisgn as defined by Campbell and Stanley.[1] This experimental design typified much of the classical nineteenth-century research in the physical sciences and biology. It was also this design which was used in the classic experiments and studies of the British Research Board in the early twentieth century to determine factors affecting factory output.[2]

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[1]Donald T. Campbell and J. C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally Company, 1963).

[2]E. Farmer, R. C. Brooks, and E. G. Chambers, A Comparison of Different Shift Systems in the Glass Trade, report 24 (London: His' Majesty's Stationery Office, 1923).

A symbol representation of the design can be presented as follows:

$O_1\ O_2\ O_3\ O_4\ X\ O_5\ O_6\ O_7\ O_8$.

In the above diagram "O" represents a unit or observation covering a specified time period and "X" represents the introduction of a treatment into the series. The sequence diagrammed above represented the outline of the series that was used in this study.

The study was designed to run for a ten-week period, which covered the time from Monday, September 4, 1978 to Friday, November 10, 1978. This time period represented ten school weeks or approximately 50 class periods of 55 minutes each. During the ten-week period expository instruction was the primary method used for eight of the ten weeks. Each week usually consisted of five class periods and represented one unit in the time-series sequence. Each unit dealt with instruction pertaining to one geographic concept. During the fifth and seventh weeks of the study, simulations were introduced and used as the means of instruction. An overview of the time-series sequence follows:

Week One--Concept was Site; instructional method--Expository.

Week Two--Function--Expository.

Week Three--Urbanization--Expository.

Week Four--Spatial Interaction--Expository.

Week Five--Urban Coalescence--Treatment 1 Simulation.

Week Six--Urban Ecology--Expository.

Week Seven--Sequent Occupance--Treatment II Simulation.

Week Eight--Urban Planning--Expository.

Week Nine--Areal Association--Expository.

Week Ten--Urban Synthesis--Expository.

It was necessary in the study to establish a sequence or pattern of questioning behavior that could be identified at the start of the study. Therefore, the first four weeks of the study utilized expository methods. The fifth and seventh weeks utilized simulation activities as primary methods of instruction. This allowed the simulations to function as treatments or variations in a series of expository methods (see Appendix B for copies of simulations). The simulations produced, by their nature, active student involvement which was lacking during expository instruction.

There were several major reasons why this design was utilized for this particular study. First, it

is a design that is structured and totally adaptable to the public school situation and to the individual classroom. Second, it is a sound research design in terms of dealing with sources of invalidity. Of the eight major sources of invalidity identified by Campbell and Stanley, the time-series design rules out seven threats to invalidity and only "history," defined as external variables, may threaten the validity of the study. Even in this instance, a careful log on nonexperimental stimuli that may influence the study would allow for plausible interpretation, and would protect the study.[3] Third, the time-series design has been used by many prominent researchers who have suggested and called for its use.[4,5]

Data Collection Procedure

All data gathered in this study was obtained via tape recordings of class activities. During eight

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[3]Ibid.

[4]T. Anderson, The Statistical Analysis of Time Series (New York: Wiley and Sons, 1971).

[5]Thomas Fox, "Reflections Upon the Use of Time-Series Design and Analysis," ERIC, 1971, 138-650.

of the ten weeks while expository procedures were being used as the primary method of class instruction, tapes were made of all class periods. One tape recorder was used to record class sessions and all questions asked by students during this phase of the study.

During weeks five and seven of the study, treatments in the form of simulations were introduced. Each simulation was structured around group activity requiring five groups of students with either six or seven students per group. Students were assigned to groups on the basis of random number assignments. After all students were assigned to one of five groups, cassette tape records were given to each group. One student in each group was responsible for the taping and operation of the recorder. A reel to reel recorder also recorded all general questions to the instructor which were not centered on group activities. Each day while simulations were being implemented six tape recorders were in operation--one per group and one for general class questions.

At the end of the study all student questions had been placed on tapes. A total of 50 reel-to-reel tapes had been recorded. This included 40 tapes of expository sessions and ten during treatments. There were

also 40 cassette tapes used to record all questions during simulation activities.

Treatment of the Data

Following completion of the study ten sets of questions totaling 1,702 were recorded and identified. In all, 54 pages of questions were prepared from recorded expository and simulation sessions. Sets of questions were divided into ten groups, each representing one unit or week of the time series.

After all sets of questions were prepared, the data (questions) were given to a committee of three social studies educators for classification. The purpose of this stage of data analysis was to remove a degree of bias from the analysis that the research director could have introduced if he had classified all data. Each member of the committee had the appropriate credentials which were established. These credentials were: (1) at least a master's degree in the area of the social sciences, (2) a minimum of five years' teaching experience in the social studies at high school or college level, (3) a familiarity with the work and categories of questioning identified by Norris M. Sanders.

Each set of questions that was given to the committee members totaled 54 pages in length and contained 1,702 questions. This included both questions pertaining to knowledge as well as procedural questions. The committee members were asked to classify only questions pertaining to course content or knowledge and to omit all questions related to classroom procedure or business.

All pages of sets of questions were placed in random order based on a random sequence of 54 digits. All information, such as dates, concepts, and number of questions, were removed from each page. Each set, when presented to each member, consisted of 54 pages of lists of unordered questions. Committee members were told of random order and the fact that all questions were out of the sequence in which they were asked. The purpose for this procedure was to remove another potential degree of bias in classification. No committee member was aware of whether questions were asked during expository procedures or simulation activities. In addition, the committee members were unaware as to when the questions were asked during the ten-week study.

At the time each member of the committee was given a set of data (questions), a conference was held

between the researcher and the committee member. The purpose of the conference was to discuss, in detail, the study and his function as a juror, as well as the seven categories or levels of classification. Each juror was given a review sheet of Sanders' categories as well as Chapter I from his book. Prior to this all jurors had worked on a set of sample questions. This sample set was to familiarize the members, as well as to identify the degree of correlation, that existed between them (see Appendix C for sample set and review sheets). On the sample sheet of 25 questions the agreement among all three jurors was 72 percent. On only one question was there disagreement greater than two levels of variation.

The following additional guidelines applied to the committee: (1) each member classified all questions independently of other members of the committee; (2) a high degree of correlation was required in the classification process; (3) all questions in the knowledge-subject area were classified and all procedural questions omitted.

The major purposes for a neutral committee to classify the sets of questions were: (1) to eliminate instructional bias which could enter the classification system if the researcher classified questions himself, and (2) to add credibility to the research findings.

The classification system used by the committee required each member to write the number of the level of question next to the question on the data sheets. The sequence and levels of questions used in the study were:

(1) Memory level questions

(2) Translation level questions

(3) Interpretation level questions

(4) Application level questions

(5) Analysis level questions

(6) Synthesis level questions

(7) Evaluation level questions

When the committee members had completed each set and returned them, the next stage of analysis began. Due to the type of categorical data being used and the detailed classification of seven categories of questions over a ten-week period, the most effective system of data analysis was a percentage analysis. This procedure was recommended by the Education Research Center at the University of Houston.

Percentage analysis consisted of several aspects beginning with daily analysis. There were four segments of data tabulation each day. They were: (1) total number of all questions recorded; (2) total number of all

procedural questions recorded; (3) number of questions asked at each of seven levels recorded--these questions were those questions which all three committee members agreed on; and (4) disagreement questions recorded--this refers to all questions which the committee failed to reach total agreement on.

This stage of analysis was followed by weekly analysis. The steps to this process were: (1) total number of agreement questions were recorded for each of the seven levels for entire week; (2) total number of all questions asked for the week were recorded; (3) total number of procedural questions were recorded; (4) total number of disagreement questions (both total and partial disagreement) were recorded; and (5) averages were determined for each of the above four steps.

Following the tabulation and recording of all data and averages, the time-series sequence was used as a basis for percentage analysis. Each of the ten weeks was examined as an independent segment in the time-series and the numbers of questions, levels of questions, procedural questions and disagreement questions were the focus of percentage increases or decreases on a weekly basis. All percentage shifts across the time-series were noted and recorded.

Another aspect of analysis that was used to protect the study against History as a major source of invalidity was a detailed weekly log of external nonexperimental stimuli. Any nonexperimental stimuli that may have had any influence on the study were recorded and will be discussed in the next chapter on data analysis.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

The study began on Tuesday, September 5, 1978, and lasted for ten weeks, ending on Friday, November 10, 1978. During the course of the study ten geographic concepts were presented. Instruction regarding each concept lasted for approximately five class periods of fifty minutes, or one week. This chapter contains a review and an analysis of the data gathered on a weekly basis and also a review of the total data. A set of time-series charts and graphs are also included in this chapter to aid in reviewing and analyzing the data.

During the data collection period a total of 1,731 questions were asked by the students. Of this total, 405 questions or 23.3 percent were of a procedural nature (see Table 26 on page 76 for a complete set of all questions asked). That is, they were questions pertaining more to classroom management and were not inquiry or information-gathering questions pertaining to the concepts

under study. The following questions were representative of those asked:

> Will you collect the notebook?
> How do you spell that?
> Does our answer have to be exact?
> What is that word on the board?
> So, are you going to count it on our grade?
> Do we need to take notes on this?
> Do we need to know that?
> Did you say Houston?

Since such questions as these did not pertain directly to the concepts under study, they were excluded from certain aspects of the analysis of data.

All other questions asked by the students dealt directly with the concepts under study, and hereafter will be referred to in this study as knowledge questions. The total number of knowledge questions was 1,326.

This total of knowledge questions was submitted to the committee of social studies educators for determining the taxonomical level of each question, and as a result, two categories of knowledge questions were developed: (1) total agreement and (2) disagreement. The total agreement category included all knowledge questions on which there was total agreement by the classification committee in terms of taxonomical level. The disagreement category included the knowledge questions on which there was

disagreement in terms of taxonomical level. This total was determined by subtracting the procedural questions (405) from the total of 1,731.

Of the 1,326 knowledge questions submitted to the committee of social studies educators two categories were developed. The committee agreed on the levels for 977 of the questions, or 73.6 percent of the 1,326 knowledge questions. The committee disagreed on 348 questions or 26.4 percent. The disagreement questions were divided into two groups--partial and total disagreement. Partial disagreement indicated two of the three members agreed on the level of classification, while total disagreement referred to three different responses from the committee.

Of the 348 disagreement questions, there was partial disagreement with 271 or 77.8 percent and total disagreement with seventy-seven questions or 22.2 percent. The disagreement category of knowledge questions was not included in the analysis of data; only the agreement category of knowledge questions (977 total) was analyzed. Table 1 presents a week-by-week review of Agreement and Disagreement questions with a breakdown of Disagreement questions in total and partial disagreement categories.

TABLE 1

AGREEMENT AND DISAGREEMENT QUESTIONS ASKED PER WEEK

Week	Number of Agreement Questions	Number of Disagreement Questions	Partial Disagreement	Total Disagreement
1	38	16	12	4
2	80	27	20	7
3	91	31	22	9
4	97	28	23	5
5	178	53	34	19
6	61	27	24	3
7	227	77	57	20
8	75	35	29	6
9	61	25	24	1
10	69	29	26	3

Weekly Data Analysis

In this section a week-by-week review of the data is presented. Included in this week-by-week review will be a statement as to whether or not there were any outside stimuli that could have affected student performance regarding the concepts under study.

Week One

Week One began on Tuesday, September 5 and ended on Friday, September 8. The geographic concept which was presented via expository methods was site. The week consisted of only four class periods since there was a Labor Day holiday. During this week a total of eighty-three questions was asked. Of this number twenty-nine were procedural, leaving a total of fifty-four knowledge questions. The committee agreed on thirty-eight, or 70.3 percent, of all knowledge questions and disagreed on sixteen or 29.7 percent. The data for Week One are presented in Table 2 and Table 3.

The total number of questions asked during Week One was eighty-three and this represented the lowest total number of questions asked during any week of the study. No nonexperimental stimuli were recorded.

TABLE 2

DATA FOR WEEK ONE: CONCEPT--SITE

	Level	Tuesday September 5	Wednesday September 6	Thursday September 7	Friday September 8
Total number of questions asked		21	17	25	20
Total number of procedural questions asked		7	10	2	10
Total number of knowledge questions asked		14	7	23	10
Questions asked daily at each level					
Memory	1	9	4	11	6
Translation	2	0	0	0	0
Interpretation	3	1	0	2	0
Application	4	0	0	0	1
Analysis	5	0	1	2	0
Synthesis	6	0	0	1	0
Evaluation	7	0	0	0	0
Total number of agreement questions		10	5	16	7
Total number of disagreement questions		3(P)* 1(T)* 4(FT)*	1 1 2	6 1 7	2 1 3

*In the context of weekly analysis (P) will represent partial agreement, (T) will represent total disagreement and (FT) the final total of both partial and total disagreement.

TABLE 3

SUMMARY TOTALS OF DATA FOR WEEK ONE

	Level	Number
Total number of questions at each level (agreement questions)		
Memory	1	30
Translation	2	0
Interpretation	3	3
Application	4	1
Analysis	5	3
Synthesis	6	1
Evaluation	7	0
Total number of all questions		83
Total number of procedural questions		29
Total number of knowledge questions		54
Total number of disagreement questions		16 (12P, 4T)
Total number of agreement questions		38
Percent of agreement questions by jurors		70.3

Week Two

Week Two of the study began on Monday, September 11 and ended Thursday, September 14. Friday, September 15 was used as a testing day and also included various class business. During this week a total of 145 questions was asked. Of this number thirty-eight, or 26.2 percent, were procedural questions and 107 or 73.8 percent were knowledge questions. There were twenty-seven questions which the committee disagreed on and eighty which the committee agreed on regarding levels of classification. The data for Week Two are presented in Table 4 and Table 5. No nonexperimental stimuli were recorded during this week that would influence the study regarding the concept of function.

Week Three

Week Three of the study began on Monday, September 18 and ended Friday, September 22. The geographic concept presented via expository instruction was urbanization. During this week 176 questions were asked. Of this number, fifty-three or 30.1 percent were procedural. One hundred twenty-three questions were knowledge related

TABLE 4

DATA FOR WEEK TWO: CONCEPT--FUNCTION

	Level	Monday September 11	Tuesday September 12	Wednesday September 13	Thursday September 14
Total number of all questions asked		23	45	25	52
Total number of procedural questions asked		3	9	9	17
Total number of knowledge questions asked		20	36	16	35
Questions asked daily at each level					
Memory	1	6	13	5	17
Translation	2	1	0	2	1
Interpretation	3	4	5	0	6
Application	4	0	3	2	0
Analysis	5	1	4	3	3
Synthesis	6	2	1	0	0
Evaluation	7	1	0	0	0
Total number of agreement questions		15	26	12	27
Total number of disagreement questions		3(P) 2(T) 5(FT)	8 2 10	3 1 4	6 2 8

TABLE 5

SUMMARY TOTALS OF DATA FOR WEEK TWO

	Level	Number
Total number of agreement questions at each level		
Memory	1	41
Translation	2	4
Interpretation	3	15
Application	4	5
Analysis	5	11
Synthesis	6	3
Evaluation	7	1
Total number of all questions		145
Total number of procedural questions		38
Total number of knowledge questions		107
Total number of disagreement questions		27 (20P, 7T)
Total number of agreement questions		80
Percentage of agreement questions by jurors		74.7

or 69.9 percent. Ninety-one, or 73.9 percent, of the knowledge questions were agreement questions and thirty-one, or 25.2 percent, were disagreement questions. The percentage of agreement among the classification committee was 72.3 percent. No nonexperimental stimuli were recorded that would influence the concept of urbanization during this week. The data for Week Three are presented in Table 6 and Table 7.

Week Four

Week Four began on Monday, September 25 and ended Friday, September 29. The geographic concept of spatial interaction was presented via expository methods. This was the fourth consecutive week of expository presentation. During the course of this week 176 total questions were asked. Of this total forty-nine or 27.8 percent were procedural questions. One hundred twenty-five knowledge questions were asked and the committee agreed on the classification of ninety-seven, or 77.6 percent, of the questions and disagreed on twenty-eight or 22.4 percent of the questions. No nonexperimental stimuli were recorded that would influence the study findings regarding the concept of spatial interaction. Tuesday,

TABLE 6

DATA FOR WEEK THREE: CONCEPT--URBANIZATION

	Level	Monday Sept. 18	Tuesday Sept. 19	Wednesday Sept. 20	Thursday Sept. 21	Friday Sept. 22
Total number of questions asked		36	31	36	35	38
Total number of procedural questions		14	8	4	8	19
Total number of knowledge questions		22	23	32	27	19
Questions asked daily at each level						
Memory	1	6	14	15	16	1
Translation	2	1	0	0	0	0
Interpretation	3	5	2	3	5	9
Application	4	2	0	1	1	2
Analysis	5	2	0	3	0	1
Synthesis	6	0	0	2	0	1
Evaluation	7	0	0	0	0	0
Total number of agreement questions		16	16	24	21	14
Total number of disagreement questions		4(P) 2(T) 6(FT)	6 1 7	4 4 8	4 1 5	4 1 5

TABLE 7

SUMMARY TOTALS OF DATA FOR WEEK THREE

	Level	Number
Total number of agreement questions for each level		
Memory	1	52
Translation	2	1
Interpretation	3	24
Application	4	6
Analysis	5	6
Synthesis	6	3
Evaluation	7	0
Total number of all questions		176
Total number of procedural questions		53
Total number of knowledge questions		123
Total number of disagreement questions		31 (22P, 9T)
Total number of agreement questions		91
Percentage of agreement questions by jurors		72.2

September 26 was a shortened period due to announcements regarding parent-teacher conferences. The period was shortened approximately ten minutes. The data for Week Four are presented in Table 8 and Table 9.

Week Five

Week Five of the study began on Monday, October 2 and extended through Thursday, October 5. Friday, October 6 was used for other class business. During this week Treatment I, in the form of a simulation, was introduced (see Appendix B for a summary of the simulation). The simulation was introduced after four weeks of expository procedures. A total of 258 questions was asked. This represented an increase of eighty-two questions or 31.7 percent over the highest previous total which occurred in Week Three. In terms of knowledge questions, 231 were asked or an increase of 54.1 percent over the highest number of knowledge questions which were asked in Week Four. One hundred seventy-eight agreement questions were asked, or 54.4 percent more than had been asked during any previous week.

An important find in the data of Week Five was in the area of procedural questions. While the numbers

TABLE 8

DATA FOR WEEK FOUR: CONCEPT--SPACIAL INTERACTION

	Level	Monday Sept. 25	Tuesday Sept. 26	Wednesday Sept. 27	Thursday Sept. 28	Friday Sept. 29
Total number of questions asked		43	33	37	26	35
Total number of procedural questions		14	9	6	10	10
Total number of knowledge questions		29	24	31	16	25
Questions asked daily at each level						
Memory	1	17	8	12	5	14
Translation	2	0	2	2	0	0
Interpretation	3	3	6	4	4	3
Application	4	3	0	2	1	0
Analysis	5	1	2	1	0	2
Synthesis	6	0	2	0	2	0
Evaluation	7	0	0	0	0	1
Total number of agreement questions		25	20	21	12	20
Total number of disagreement questions		4 1 5	3 1 4	8 2 10	3 1 4	5 0 5

TABLE 9

SUMMARY TOTALS OF DATA FOR WEEK FOUR

	Level	Number
Total number of agreement questions for each level		
Memory	1	56
Translation	2	4
Interpretation	3	20
Application	4	6
Analysis	5	6
Synthesis	6	4
Evaluation	7	1
Total number of all questions		174
Total number of procedural questions		49
Total number of knowledge questions		125
Total number of disagreement questions		28 (23P, 5T)
Total number of agreement questions		97
Percentage of agreement questions by jurors		77.6

of questions during this week increased in all categories, they decreased in the number of procedural questions asked. Of the total 258 questions twenty-seven were procedural questions.

During Week One twenty-nine procedural questions were asked, but this was out of eighty-three total. The percentage of procedural questions asked during Week Five was 10.4 percent as compared to 34.9 percent, 26.2 percent, 30.1 percent, and 28.1 percent during the previous four weeks. This represents a decrease of 15.8 percent over the next closest week regarding numbers of procedural questions.

The number of disagreement questions increased to fifty-three. Of this number, thirty-four were partial disagreement and nineteen total disagreement.

When comparing the seven levels of agreement questions during Week Five certain factors become evident when compared to the four previous weeks of expository lessons. At level one, the memory level, 113 questions were asked, compared to thirty, forty-one, fifty-two, and fifty-six, respectively. This indicates a sharp increase in the number of memory level questions asked. This represents an increase of 49.5 percent over the next highest

number of memory level questions which was fifty-six during the previous week (Week Four).

At level two, translation, a total of twelve questions was asked as compared to the next highest number of four asked during Weeks Two and Four. This represented an increase of 200 percent in the category of translation questions.

With regard to level three, interpretation, sixteen questions were asked. This represented a decrease of 33 percent from the twenty-four level three questions which were asked during Week Three. Level four questions, application level, also decreased from a high number of six the previous two weeks to two. This represents a decrease of 66 percent.

Level five questions, analysis questions, showed a sharp increase, both in numbers and in percentage during the treatment. A total of twenty-five analysis questions were asked compared to eleven, the next highest number, which were asked during Week Two. This represents an increase of 112 percent in the area of analysis level questions.

Level six, synthesis level questions, totaled nine during Week Five. This was an increase of 111

percent over the next highest number of synthesis level questions which totaled four and were asked in Week Four. Only one level seven question was asked during Week Five and this was equaled in Weeks Two and Four (see Tables 10 and 11). Additional data for Week Five are presented in Table 12 and Table 13.

Week Six

Week Six began on Monday, October 9 and lasted until Friday, October 13. The geographic topic which was presented was urban ecology and the method of presentation was expository. The total number of questions asked was 140. Of this number, fifty-two or 37.1 percent were procedural in nature. The total number of knowledge questions was eighty-eight. Sixty-one of the knowledge questions were agreed on by committee members as to the level of classification. This represented a 69.3 percent agreement level. There were twenty-seven or 30.7 percent disagreement questions. On Tuesday, October 9 an advisory period was held. This lasted fifteen minutes and class time was reduced by fifteen minutes. No nonexperimental stimuli were recorded which would influence student

TABLE 10

PERCENTAGE SHIFTS PER LEVEL FOR AGREEMENT QUESTIONS

	Level	Number Asked	Next Highest Number Asked in a Previous Week	Percentage Change Compared to Previous Week
Memory	1	113	56	+ 49%
Translation	2	12	4	+200
Interpretation	3	16	24	- 33
Application	4	2	6	-200
Analysis	5	25	11	+112
Synthesis	6	9	4	+111
Evaluation	7	1	1	0

TABLE 11

PERCENTAGE SHIFTS BASED ON TOTAL NUMBER OF QUESTIONS ASKED AND QUESTIONS ASKED AT EACH LEVEL

	Level	Questions Asked Each Week as a Percentage of the Total Number of Agreement Questions				
		Week 1	Week 2	Week 3	Week 4	Week 5
Memory	1	78.9	51.2	57.1	57.7	63.4
Translation	2	0	5.0	1.0	4.1	6.7
Interpretation	3	7.8	18.7	26.3	20.6	8.9
Application	4	2.6	6 2	6.5	6.1	1.1
Analysis	5	7.8	13.7	6.5	6.1	14.0
Synthesis	6	2.6	3.7	3.2	4.1	5.0
Evaluation	7	0	1.2	0	1.0	.05

TABLE 12

DATA FOR WEEK FIVE: CONCEPT--URBAN COALESCENCE

	Level	Monday October 2	Tuesday October 3	Wednesday October 4	Thursday October 5
Total number of all questions asked		26	75	81	76
Total number of procedural questions		6	10	6	5
Total number of knowledge questions asked		20	65	75	71
Questions asked daily at each level					
Memory	1	13	24	40	36
Translation	2	0	6	4	2
Interpretation	3	0	7	4	5
Application	4	1	0	1	0
Analysis	5	0	8	8	9
Synthesis	6	0	3	3	3
Evaluation	7	0	0	1	0
Total number of agreement questions		14	48	61	55
Total number of disagreement questions		4(P) 1(T) 6(FT)	12 5 17	5 9 14	12 4 16

TABLE 13

SUMMARY TOTALS OF DATA FOR WEEK FIVE

	Level	Number
Total number of agreement questions for each level		
Memory	1	113
Translation	2	12
Interpretation	3	16
Application	4	2
Analysis	5	25
Synthesis	6	9
Evaluation	7	1
Total number of all questions		258
Total number of procedural questions		27
Total number of knowledge questions		231
Total number of disagreement questions		53 (34P, 19T)
Total number of agreement questions		178
Percentage of agreement questions by jurors		77.0

questioning patterns during this week. The data for Week Six are presented in Table 14 and Table 15.

Week Seven

The introduction of Treatment II took place during Week Seven of the study. The geographic concept being examined was sequent occupance and extended over the time period from Monday, October 16 through Thursday, October 19. Friday, October 20 was used as a debriefing period. This treatment represented the second and final treatment of the study.

During Week Seven a total of 361 questions was asked. This was the largest total number of questions asked during the study. It represented an increase of 103 or 28.5 percent more questions than were asked during Treatment I. There was a total of 185 more questions asked during Treatment II than any week of expository presentation. This represented an increase of 106.2 percent increase between the largest total number of questions asked during expository and simulation weeks.

A total of 304 knowledge questions was asked during Treatment II. This represented an increase of

TABLE 14

DATA FOR WEEK SIX: CONCEPT--URBAN ECOLOGY

	Level	Monday October 9	Tuesday October 10	Wednesday October 11	Thursday October 12	Friday October 13
Total number of questions asked		24	25	32	31	28
Total number of procedural questions		11	13	12	7	9
Total number of knowledge questions		13	12	20	24	19
Questions asked daily at each level						
Memory	1	6	5	13	9	10
Translation	2	1	0	0	1	0
Interpretation	3	3	2	1	3	0
Application	4	0	0	0	0	0
Analysis	5	0	0	0	0	3
Synthesis	6	0	0	0	1	0
Evaluation	7	0	0	0	2	1
Total number of agreement questions		3(P) 0(T) 3(FT)	4 1 5	6 0 6	8 0 8	3 2 5
Total number of disagreement questions		10	7	14	16	14

TABLE 15

SUMMARY TOTALS OF DATA FOR WEEK SIX

	Level	Number
Total number of agreement questions at each level		
Memory	1	42
Translation	2	2
Interpretation	3	9
Application	4	0
Analysis	5	3
Synthesis	6	1
Evaluation	7	3
Total number of all questions		140
Total number of procedural questions		52
Total number of knowledge questions		88
Total number of disagreement questions		27 (24P, 3T)
Total number of agreement questions		61
Percentage of agreement questions by jurors		69.3

seventy-three or 24.1 percent increase over Treatment I. The largest number of knowledge questions asked during any expository week was 125. A difference of 179 questions or 117 percent was noted between Treatment II and Week Four, during which the largest number of knowledge questions was recorded.

Of the 304 knowledge questions the committee reached agreement on 227 or 74.6 percent of the questions. There was disagreement on seventy-seven questions. Both the number of agreement questions and disagreement questions represent the most asked during the study in each category.

Supporting the data in Treatment I, it was noted that a lower percentage of procedural questions was asked. A total of fifty-seven was asked out of 361 total questions and 304 knowledge questions. This represents a percentage rate of 15.7 percent in relation to total questions and 18.7 percent in relation to knowledge questions. In relation to this, the number of procedural questions asked during the five previous expository weeks was 34.9 percent, 26.2 percent, 30.1 percent, 28.1 percent, and 37.1 percent when compared to weekly total questions and 53.7 percent, 35.5 percent, 43.0 percent, 39.2 percent,

59.0 percent when compared to numbers of knowledge questions asked, respectively. Table 16 presents a percentage difference between Treatment II and the highest expository total of knowledge questions.

Table 16 indicates percentage increases in five of seven levels of questions. Levesl three and four show decreases while one, two, five, six, and seven show increases. Another phase of analysis is the percentage comparison of the numbers of questions asked at each level in relation to the total number of knowledge questions asked during the week (see Table 17).

From Table 17 it becomes evident that the percentages of questions asked during Treatment II do not change drastically when compared with the six previous weeks of instruction. A high percentage of level one questions was asked--72.2 percent. Week One, using expository methods, had a 78.9 percent and at all levels, two through seven, the expository sessions were in the same percentage range at Treatment II. At least one expository week had a higher percentage of questions asked than did Treatment II at each individual level. The data for Week Seven are presented in Table 18 and Table 19.

TABLE 16

PERCENTAGE DIFFERENCE BETWEEN TREATMENT II AND HIGHEST EXPOSITORY TOTAL OF KNOWLEDGE QUESTIONS PER LEVEL

	Level	Expository--Knowledge	Treatment II Knowledge	Percentage Difference
Memory	1	56	164	+168
Translation	2	4	7	+ 57.1
Interpretation	3	24	15	- 62.5
Application	4	6	1	-500
Analysis	5	11	29	+124.1
Synthesis	6	4	6	+ 33
Evaluation	7	3	5	+ 60

TABLE 17

PERCENTAGE COMPARISON OF ALL AGREEMENT QUESTIONS ASKED PER LEVEL WITH WEEKLY AGREEMENT TOTAL (TREATMENT I IS ALSO INCLUDED)

	Level						
Week	(1) Memory	(2) Trans-lation	(3) Interpre-tation	(4) Applica-tion	(5) Analy-sis	(6) Synthe-sis	(7) Evalua-tion
1	78.9	0	7.8	2.6	7.8	2.6	0
2	51.2	5.0	18.7	6.2	13.7	3.7	1.2
3	57.1	1.0	26.3	6.5	6.5	3.2	0
4	57.7	4.1	20.6	6.1	6.1	4.1	1.0
Treat-ment I							
5	63.4	6.7	8.9	1.1	14.0	5.0	0.5
6	70.4	3.2	14.6	0	4.9	1.6	4.9
Treat-ment II							
7	72.2	3.0	6.6	0.4	12.7	2.6	2.2

TABLE 18

DATA FOR WEEK SEVEN: CONCEPT--SEQUENT OCCUPANCE

	Level	Monday October 16	Tuesday October 17	Wednesday October 18	Thursday October 19
Total number of all questions asked		90	70	104	97
Total number of procedural questions		13	12	16	16
Total number of knowledge questions		77	58	88	81
Questions asked daily at each level					
Memory	1	40	32	46	46
Translation	2	0	2	2	3
Interpretation	3	4	2	3	6
Application	4	1	0	0	0
Analysis	5	11	5	10	3
Synthesis	6	4	0	1	1
Evaluation	7	0	1	1	3
Total number of agreement questions		60	42	63	62
Total number of disagreement questions		16(P) 1(T) 17(FT)	10 6 16	17 8 25	14 5 19

TABLE 19

SUMMARY TOTALS OF DATA FOR WEEK SEVEN

	Level	Number
Total number of agreement questions for each level		
Memory	1	164
Translation	2	7
Interpretation	3	15
Application	4	1
Analysis	5	29
Synthesis	6	6
Evaluation	7	5
Total number of all questions		361
Total number of procedural questions		57
Total number of knowledge questions		304
Total number of disagreement questions		77 (57P, 20T)
Total number of agreement questions		227
Percentage of agreement questions by jurors		74.6

Week Eight

Week Eight focused on the geographic topic of urban planning. The week lasted from Monday, October 23 through Thursday, October 26. No classes were held on Friday, October 27 due to the Texas State Teachers Association conference in Austin. During Week Eight a total of 149 questions were asked with thirty-one, or 26.2 percent, being procedural questions. A total of 110 knowledge level questions were asked with seventy-five, or 68.1 percent, being agreed upon as to level of classification. There was committee disagreement on thirty-five questions or 31.9 percent.

A number of articles appeared in the Austin newspaper during this week referring to planning development and planning programs for Austin but had little or no impact on the study as nonexperimental stimuli. This was determined during the final class period of Week Eight when students were asked if they had read any of the articles pertaining to urban planning in Austin, and not one student had. The data for Week Eight are presented in Table 20 and Table 21.

TABLE 20

DATA FOR WEEK EIGHT: CONCEPT--URBAN PLANNING

	Level	Monday October 23	Tuesday October 24	Wednesday October 25	Thursday October 26
Total number of all questions asked		43	42	37	27
Total number of procedural questions		11	14	9	5
Total number of knowledge questions		32	28	28	22
Questions asked daily at each level					
Memory	1	17	9	13	10
Translation	2	0	0	1	0
Interpretation	3	2	8	5	2
Application	4	0	1	2	0
Analysis	5	1	1	0	1
Synthesis	6	0	0	0	0
Evaluation	7	1	1	0	0
Total number of agreement questions		21	20	21	13
Total number of disagreement questions		9(P) 2(T) 11(FT)	7 1 8	5 2 7	8 1 9

TABLE 21

SUMMARY TOTALS OF DATA FOR WEEK EIGHT

	Level	Number
Total number of agreement questions for each level		
Memory	1	49
Translation	2	1
Interpretation	3	17
Application	4	3
Analysis	5	3
Synthesis	6	0
Evaluation	7	2
Total number of all questions		149
Total number of procedural questions		39
Total number of knowledge questions		110
Total number of disagreement questions		35 (29P, 6T)
Total number of agreement questions		75
Percentage of agreement questions by jurors		68.1

Week Nine

Week Nine of the study began on Monday, October 30 and lasted through Friday, November 3. The geographic concept that was presented was areal association and the method of presentation was expository. A total of 117 questions was asked with thirty-one, or 26.5 percent, being procedural questions. Eighty-six knowledge questions were asked with the agreement total being sixty-one or 70.9 percent. There were twenty-five questions which were in disagreement. No nonexperimental stimuli were noted that would affect the validity of the study during this week. No class was held on Tuesday, October 31 due to schoolwide presentation on career programs to all ninth-grade classes. The data for Week Nine are presented in Table 22 and Table 23.

Week Ten

Week Ten began Monday, October 6 and extended through Thursday, October 9. During this final week of the study expository methods were used and the geographic topic presented was urban synthesis. A total of 128 questions was asked with thirty, or 23.5 percent, being

TABLE 22

DATA FOR WEEK NINE: CONCEPT--AREAL ASSOCIATION

	Level	Monday October 30	Tuesday November 1	Wednesday November 2	Friday November 3
Total number of all questions asked		34	29	32	22
Total number of procedural questions		12	7	8	4
Total number of knowledge questions		22	22	24	18
Questions asked daily at each level					
Memory	1	11	7	7	4
Translation	2	0	0	2	3
Interpretation	3	3	8	7	4
Application	4	0	1	0	1
Analysis	5	0	0	2	1
Synthesis	6	0	0	0	0
Evaluation	7	0	0	0	0
Total number of agreement questions		14	16	18	13
Total number of disagreement questions		8(P) 0(T) 8(FT)	6 0 6	6 0 6	4 1 5

TABLE 23

SUMMARY TOTALS OF DATA FOR WEEK NINE

	Level	Number
Total number of agreement questions for each level		
Memory	1	29
Translation	2	5
Interpretation	3	22
Application	4	2
Analysis	5	3
Synthesis	6	0
Evaluation	7	0
Total number of all questions		117
Total number of procedural questions		31
Total number of knowledge questions		86
Total number of disagreement questions		25 (24P, 1T)
Total number of agreement questions		61
Percentage of agreement questions by jurors		70.9

procedural in nature. Ninety-eight knowledge questions were asked with sixty-nine being in agreement. This was a 70.4 percent agreement ratio by the committee. There was disagreement with twenty-nine questions, or a 29.6 percent disagreement ratio. No nonexperimental stimuli were noted during this week. The data for Week Ten are presented in Table 24 and Table 25.

The study ended on Thursday, November 9. The total study time period from the first to last class observations was sixty-seven days. A total of forty-three class periods had been observed with a total of seventy-five hours of tapes recorded. From the tapes were extracted a total of 1,731 student questions. The next section of this chapter will compile the weekly data and analyze the cumulative totals of the data gathered.

Analysis of Total Data

During the course of the study all student questions were recorded and classified into one of seven levels by a committee of social studies educators. Table 26 presents the total number of questions asked per level as agreed upon by the committee.

TABLE 24

DATA FOR WEEK TEN: CONCEPT--URBAN SYNTHESIS

	Level	Monday November 6	Wednesday November 7	Thursday November 8	Friday November 9
Total number of all questions asked		27	32	30	39
Total number of procedural questions		5	2	8	15
Total number of knowledge questions		22	30	22	24
Questions asked daily at each level					
Memory	1	7	7	8	5
Translation	2	0	0	0	1
Interpretation	3	4	11	8	8
Application	4	1	2	1	0
Analysis	5	1	1	0	0
Synthesis	6	0	3	0	1
Evaluation	7	0	0	0	0
Total number of agreement questions		13	24	17	15
Total number of disagreement questions		8(P) 1(T) 9(FT)	6 0	5 0	7 2

TABLE 25

SUMMARY TOTALS OF DATA FOR WEEK TEN

	Level	Number
Total number of agreement questions for each level		
Memory	1	27
Translation	2	1
Interpretation	3	31
Application	4	4
Analysis	5	2
Synthesis	6	4
Evaluation	7	0
Total number of all questions		128
Total number of procedural questions		30
Total number of knowledge questions		98
Total number of disagreement questions		29 (26P, 3T)
Total number of agreement questions		69
Percentage of agreement questions by jurors		70.4

TABLE 26

QUESTIONS ASKED EACH WEEK PER LEVEL OF CLASSIFICATION

(INCLUDES AGREEMENT QUESTIONS ONLY)

	Level						
	1	2	3	4	5	6	7
Week	Memory	Trans-lation	Interpre-tation	Applica-tion	Analy-sis	Synthe-sis	Evalua-tion
1	30	0	3	1	3	1	0
2	41	4	15	5	11	3	1
3	52	1	24	6	6	3	0
4	56	4	20	6	6	4	1
5	113	12	16	2	25	9	1
6	43	2	9	0	3	1	3
7	164	7	15	1	29	6	5
8	49	1	17	3	3	0	2
9	29	5	22	2	3	0	0
10	27	1	31	4	2	4	0

From Table 26 it was noted that during Treatments I and II more total questions were asked at levels one, two, five, and six. At levels three, four, and seven there were as many questions or more questions asked during the expository sessions. The total numbers of questions asked (Table 26) were converted to percentages as shown in Table 27.

Table 27 shows that the highest percentages of questions asked were asked at level one, the memory level. The range was from 47.0 percent during Week Nine to 78.9 percent during Week One. Other levels are much lower. Treatments I and II do not have higher percentages than expository methods. At level five, the analysis level, Treatments I and II do show a rise to 14.0 percent and 12.7 percent, respectively, which is nearly double the percentage of any expository week with the exception of Week Two. During Week Two, 13.7 percent of all questions asked were at level five. This is nearly identical to the 14.0 percent and 12.7 percent of the two treatments. The averaged percentages for the entire study in both expository and treatments are shown in Table 28.

According to Table 28, the percentages of questions asked during the treatments do not vary greatly with

TABLE 27

PERCENTAGE OF QUESTIONS ASKED WEEKLY AT EACH LEVEL WITH AGREEMENT QUESTIONS

	Level						
	1	2	3	4	5	6	7
Week	Memory	Trans-lation	Interpre-tation	Applica-tion	Analy-sis	Synthe-sis	Evalua-tion
1	78.9	0	7.8	2.6	7.8	2.6	0
2	51.2	5.0	18.7	6.2	13.7	3.7	1.2
3	57.1	1.0	26.3	6.5	6.5	3.2	0
4	57.7	4.1	20.6	6.1	6.1	4.1	1.0
5	63.4	6.7	8.9	1.0	14.0	5.0	0.5
6	70.0	3.2	14.7	0	4.9	1.6	4.9
7	72.2	3.9	6.6	0.1	12.7	2.6	2.2
8	65.3	1.3	22.6	4.0	4.0	0	2.6
9	47.0	8.1	36.0	3.2	4.9	0	0
10	39.1	1.4	44.9	5.7	2.8	5.7	0

TABLE 28

PERCENTAGES OF EXPOSITORY QUESTIONS TO

TREATMENT QUESTIONS AT EACH LEVEL

	Level	Expository	Treatment
Memory	1	58.2	67.8
Translation	2	3.0	5.3
Interpretation	3	23.0	7.7
Application	4	4.2	0.5
Analysis	5	6.3	13.3
Synthesis	6	2.6	3.8
Evaluation	7	1.2	1.3

expository methods. The greatest difference in percentages is at the memory level where 9.6 percent questions were asked. Level two showed an increase of 2.3 percent while level three showed expository methods producing 15.3 percent more questions at the interpretation level. Level four showed a 3.7 percent greater number of questions asked via expository while level five (analysis level) showed a 7.0 percent higher number of questions asked during simulated activities. Level six showed 1.2 percent more questions via simulated activities with level seven showing a slight .1 percent increase of simulated activity questions in relation to expository activities.

Table 29 presents total numbers of questions and other cumulative data. From the data in Table 29 the various totals of questions have been determined. Of the 1,731 total questions, there were 1,326 that focused on course content or knowledge. Four hundred five questions were procedural in nature. Of the 1,326 knowledge questions, the classification committee reached agreement on 977 or 73.6 percent and disagreed on 348 or 26.4 percent. Of this total, 271 were of partial disagreement and seventy-seven of total disagreement.

One significant aspect that was determined during the data analysis process was the relationship between

TABLE 29

TOTALS OF VARIOUS TYPES OF QUESTIONS AND INFORMATION

Week	Types of Questions				Percent Committee Agreement	Disagreement Question Total	Partial Disagreement	Total Disagreement
	Agreement	Knowledge	Procedural	Total				
1	38	54	29	83	70.3	16	12	4
2	80	107	38	145	74.7	27	20	7
3	91	123	53	176	72.2	31	22	9
4	97	125	49	174	77.6	28	22	5
5	178	231	27	258	77.0	53	34	19
6	61	88	52	140	69.3	27	24	3
7	227	304	57	361	74.6	77	57	20
8	75	110	39	149	68.1	35	29	6
9	61	86	31	117	70.9	25	24	1
10	69	98	30	128	70.4	29	26	3
Total	977	1,326	405	1,731	73.6	348	271	77

the percentage of knowledge questions asked and the percentage of procedural questions asked during expository weeks and during the treatment weeks (see Table 30).

From Table 30 it is clear that during Weeks Five and Seven (treatment weeks) a decrease occurred in the percentage of procedural questions asked and an increase in the percent of knowledge questions. The percentage of procedural questions asked was 10.5 percent and 15.8 percent, respectively. The lowest percentage of procedural questions of any expository week occurred during Week Ten; this was 23.5 percent. The average for the treatment periods was 13.1 percent procedural questions compared to 29.2 percent or a difference of 16.1 percent. This indicates that during the simulated activities a decrease in the percentage of procedural questions occurred, resulting in a higher percentage of knowledge questions. During the treatments the percentage of knowledge questions was 89.5 percent and 84.2 percent, respectively. This resulted in an average of 86.8 percent of the questions asked over the 2-week treatment periods being in the knowledge category.

In comparison, the 8-week expository phase averaged 70.8 percent knowledge questions. The difference

TABLE 30

PERCENTAGE OF PROCEDURAL AND KNOWLEDGE QUESTIONS ASKED EACH WEEK

Week	Percent of Question Type	
	Knowledge	Procedural
1	65.0	35.0
2	73.7	26.3
3	69.3	30.7
4	71.8	28.2
5	89.5	10.5
6	62.8	37.2
7	84.2	15.8
8	73.8	26.2
9	73.5	26.5
10	76.5	23.5

between the percentages of knowledge questions during treatment periods was 16.0 percent. This means that during this study, while simulation activities were being used, on an average weekly basis 16 percent more questions focused on knowledge or course content as compared to procedural type questions.

A final aspect of analysis will be a review of disagreement questions as classified by committee. The classification committee was able to agree on the level of question for 977 questions and disagree on 348. Of the 348 questions that were disagreed on, 271 were placed in the category of partial disagreement and seventy-seven in total disagreement. Partial disagreement refers to agreement, as to the level of the question, by two of the three members of the committee. Total disagreement refers to all three committee members disagreeing on the level of classification. Table 31 presents a weekly breakdown of disagreement questions by committee.

In relation to the total number of knowledge questions, the disagreement questions represented 26.4 percent of the total. Due to the range and disparity of disagreement these questions were not included in the percentage analysis unless specifically mentioned. The

TABLE 31

DISTRIBUTION OF DISAGREEMENT QUESTIONS BY CLASSIFICATION COMMITTEE

Week	Total Number of Disagreement Questions	Partial Disagreement	Total Disagreement
1	16	12	4
2	27	20	7
3	31	22	9
4	28	23	5
5	53	34	19
6	27	24	3
7	77	57	20
8	35	29	6
9	25	24	1
10	29	26	3
Total	348	271	77

calculations in this chapter were primarily based on knowledge questions and specifically on agreement questions of the classification committee.

In Appendix F are a series of graphs illustrating various aspects of the study. Each graph is set up to illustrate the time-series design in relation to the data gathered during the study.

In conclusion, this chapter has presented the data gathered during the course of the study and has analyzed it via a percentage analysis. Data were reviewed on a weekly basis and also on a cumulative basis examining the entire body of data as a whole. The following chapter will present the summary, conclusions, recommendations and implications of the study.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Summary

This study was conducted to investigate the impact of simulations on the development of student questioning behavior. The study began on Tuesday, September 5, 1978, and lasted for ten weeks, ending on Friday, November 10, 1978. The research design used was the Time-Series design. During the study period ten geographic concepts were presented to thirty-three ninth-grade students at Anderson High School in Austin, Texas. Each concept was presented for a period of one week and examined by either expository teaching methods or simulations. During eight of the ten weeks expository methods were used for instruction. During weeks five and seven simulations were used as the instructional methods.

A total of 1,731 student questions was recorded during the course of the study. These questions were placed in random sequence and distributed to a committee

of three social studies educators to classify as to the taxonomical level of each question. The levels were based on the levels of questions as defined by Norris M. Sanders. Of the 1,731 questions, 405 were procedural questions related to classroom business and not subject matter. These questions were excluded from analysis.

Following the classification by committee the results were analyzed via a percentage analysis process. During each week the total number of questions asked daily at each level was recorded. Cumulative totals were also determined for each week. All questions asked during the weeks of expository instruction were compared with questions asked during the weeks of simulation instruction. This comparison was to determine and identify percentage differences and patterns that were observable during the course of the study regarding total numbers of questions asked and numbers of questions asked at each taxonomical level.

Conclusions

The two hypotheses tested in this study were:

Hypothesis 1. The introduction of simulations, as treatments in a time-series sequence of expository teaching procedures,

will produce an increased percentage of higher-level questions asked by students.

Hypothesis 2. The introduction of simulations, as treatments in a time-series sequence of expository teaching procedures, will produce an increase in the total number of questions asked by students.

Based on the data gathered during the course of this study, the first hypothesis, dealing with an increased percentage of higher-level questions, was not supported by the data. From levels four through seven when the percentage averages were calculated, an expository week had the highest average percentage of questions asked per level. During the treatment periods slight percentage increases were noted over the remaining expository weeks.

On the basis of a level-by-level comparison, again expository methods caused higher percentages of higher-level questions than did the simulation activities. Level four (application) indicated an increased percentage in favor of expository methods. On the average, for each week 4.2 percent of all questions asked were level four questions during expository sessions with less than

1 percent occurring during simulation activities. Level five (analysis) questions averaged 6.3 percent per week during expository and 13.3 percent during simulation activities. This difference of 7 percent was the only major difference supporting simulations in relation to expository procedures and will be discussed in more detail later in the chapter.

Level six questions (synthesis) averaged 2.6 percent weekly during expository sessions and 3.8 percent during simulations and indicated a 1.2 percent increase in higher-level questions during simulated activities. Level seven (evaluation) questions showed an average of 1.2 percent of all questions asked during expository and 1.3 percent simulation activities or an increase of 0.1 percent. Simulation activities or treatments did, therefore, show percentage increases in three of the four higher levels of questions asked and a percentage decrease at level four (application) only.

With regard to the second hypothesis pertaining to an increase in the total number of questions asked, the data supported this hypothesis and, therefore, this hypothesis was accepted. During weeks five and seven 258 and 361 questions were asked, respectively. These numbers

represented an increase of eighty-two questions, 185 more questions asked during weeks five and seven, respectively, as compared to the highest total number of questions asked during any expository session. The following statement sums up the findings of this study regarding the tested hypothesis: In relation to expository procedures, simulations do increase the total number of questions asked by students but do not increase the overall percentages of higher level question asked.

One important finding of the study, in addition to the testing of the hypotheses, involved the apparent impact of simulations on the percentage of procedural questions asked. With regard to procedural questions, during the simulation activities there was a sharp decline in the percentage of procedural questions. The difference was an average of 16 percent more procedural questions asked during expository classes. Taken inversely, this produced a 16 percent increase during simulations of knowledge questions. Based on the data gathered and the observation of the researcher the reason for the decline in procedural questions was related to the increase of student activity and involvement which occurred during the simulations. Student interest and activity minimized the number

of procedural questions once the simulations were in operation. Students appeared to, and did, solve procedural problems without teacher assistance. The interest which the simulations generated fostered student interest to the point where the process was learned quickly and the content became of prime importance. This allowed the students to focus more time and energy on knowledge related questions and subject content.

The interest generated by the simulated activities may also have been the primary reason for the increase in the total numbers of overall questions and knowledge questions. Interest, coupled with a greater degree of class freedom, seemed to create an environment conducive to inquiry oriented class behavior on the part of the students. Based on taped material which was reviewed, students were able to raise more questions, discuss them openly and seek solutions at their own rate and pace without controls and directions being given constantly by the instructor. The result was an increase in questions asked and a decrease in procedural questions asked.

An additional important finding of the study was the increase in analysis level questions asked during the treatment periods. The students asked a large number

and relatively high percentage of analysis questions when compared to expository weeks. In terms of numbers, twenty-five and twenty-nine analysis questions were asked during weeks five and seven, respectively. This was in relation to eleven analysis questions asked during the highest expository week. This represented a doubling of analysis level questions during both weeks of simulation activities. Since analysis level questions required the solution of a problem and the nature of simulation activities was to present students with a hypothetical life situation calling for the analysis or solution to problems, a direct relationship may exist between simulations and analysis level questions.

A review of the variables involved in the study also appears evident at this point. As the study began and progressed several unanticipated variables became evident. Fortunately, for this study these variables did not have any negative impact but should be considered in any future research. Two of the variables involved the student population and one variable involved the teacher as researcher. In regards to the student population the variable of student attendance was extremely important. High attendance was necessary to maintain a consistency

throughout the study. This might be balanced with a large population which could serve as a means of protecting the validity of the study. It also was evident during the study that one or two students who ask a high number of questions could influence the data with their presence as well as their absence from class. A third variable which was perhaps the most important was teacher behavior. The behavior and consistency of the teacher in following the expository and nonexpository procedures were essential to the validity and success of the study.

Implications

The results of this study have implications for several areas in education. During both simulations student involvement in class activities increased, as was supported by the large numbers of content-oriented questions asked by the students. Since simulations in this study did foster an increase in the total number of questions asked, simulations appear to be an effective activity in the classroom and should be used more frequently by teachers in the social studies.

The additional use of simulations in social studies is also supported by the finding related to the

high percentage of analysis level questions asked during the simulation activities. During both simulation periods more than twice the number of analysis questions were asked than in any of the eight expository weeks. In all but one of the expository weeks, analysis level questions increased more than four times, or over 300 percent!

This finding also leads to a second implication pertaining to simulations and the nature of the social studies. The social studies focus on course content aimed at developing citizens who can function effectively in a democratic society characterized by dissonance and numerous social problems. At the same time, simulations allow students to role play hypothetical social situations and to seek solutions to problems. Through simulations students can practice solving hypothetical problems much like the real problems confronting society. During simulations students attempt to analyze problems and to seek solutions via analysis level questions. The teacher can utilize their analysis level questions for directing problem solving. Hence, the second implication is this: The use of simulations can more effectively promote the development of citizens able to cope with the problems characteristic of democratic living.

A final implication deals with the use of simulations and geography. This study was conducted in a high school geography class, and the study showed that the students asked a larger number of questions and more analysis questions during the simulation periods. Hence, the use of simulations in geography classes may produce students who are more inquiry oriented and who are more able to analyze geographical problems.

In addition, the use of simulations in geography classes may be useful in helping students understand the processes of inquiry and analysis used by geographers when they are conducting research. Finally, since knowledge and information are transitory and may be obsolete in a short time period, the ability to aid students in becoming decision makers may be best accomplished by using geographic simulations which focus on the process of analysis rather than information.

In summary, and according to this study, it would appear that the use of simulations in geography would enhance the ability of students to inquire and to become aware of how new geographical knowledge is secured.

Recommendations for Future Research

Based on the results of this study and the experience of conducting it, the following recommendations are made for future research:

1. A study should be conducted to investigate the relationship of simulation-type activities to the use of procedural and subject matter questions.
2. A study should be conducted to examine the relationship between grades and exam scores when total numbers of questions increase during instructional activities.
3. A study should be conducted to examine the impact of simulations on questioning behavior of students from various socioeconomic levels.
4. A study should be conducted to investigate the linkage between analysis level questions and simulation-type activities.
5. A study should be conducted to investigate the effects of simulations on the questioning behavior of students at various grade levels.

A P P E N D I X E S

A P P E N D I X A

DEFINITIONS OF LEVELS OF QUESTIONS USED IN THIS STUDY

The questions asked by students during the course of this study were classified according to the levels of questioning developed by Norris M. Sanders in Classroom Questions--What Kinds? These levels of questions were also directly related to the research of Benjamin S. Bloom and presented in Taxonomy of Educational Objectives. The levels are:

1. Memory level--The student asks a question that calls for a simple definition or restatement of material.
2. Translation Level--The student asks a question in which information is sought at the same level but in a different symbolic form or language. The classic teacher translation question to a student is, "Now answer that in your own words." In effect, a translation question from a student is asking for an idea or concept to be translated into another form of communication--but at the same level.
3. Interpretation Level--The student asks a question seeking relationships among facts, generalizations, definitions, values, or skills.

4. Application Level--The student asks a question which relates to a problem that approximates the form and context in which they would be encountered in real life. This question indicates a level of transfer that has taken place relating concepts, ideas, etc., to the real world.
5. Analysis Level--An analysis question is more complex than all previous levels of questions. By definition, it requires the solution of a problem in the light of conscious knowledge of the aspects and processes of reasoning necessary to ask such a question. This may be a difficult type of question to identify, since it calls for a conscious knowledge of the thought process involved. This level goes beyond the common sense levels in interpretation and application.
6. Synthesis Level--The student asks a question that indicates a level of original or creative thinking while seeking the answer to the problem. This type of question is generated in a classroom atmosphere that seeks and rewards inquiry and originality and allows for the open seeking of answers and solutions to problems.

7. Evaluation Level--A question is asked seeking a judgment of good or bad, right or wrong, according to the standard designated by the student.

A P P E N D I X B

SIMULATIONS USED AS TREATMENTS IN THE STUDY

Simulation--Treatment I

Urban Coalescence--Week Five

The first simulation used in the study focused on the concept of urban coalescence. A description of the simulation and the sequence of activities in the simulation follow.

Each student in the class was assigned, by random selection, to one of five groups. Four of the groups represented towns or cities of various sizes and one group represented a citizens' advisory group. Two cities, Urbania and Metropolica, represented large cities of one-half million population and two other towns (Microville and Centerville) represented smaller political units located between Urbania and Metropolica. The focus of the simulation was to consider reasons and factors related to the incorporation of either Microville or Centerville into one of the larger cities.

Each group of students consisted of approximately seven students and each student was given an information sheet about his town or city. He was also given additional role information by the instructor regarding

his city or town and his position in it. The citizens' advisory group represented a variety of people, specifically a rancher, businessman, middle-income factory worker, lawyer, housewife and doctor. Their role was to represent the people of the region in deciding what was best for most of the population.

After roles and groups were assigned a series of urban growth cards were presented and the elected mayor of each town or city selected one or more cards during the course of the simulation. The topics of the urban growth cards were:

1. Exodus of middle-class tax base to suburbs
2. Increase in crime in Urbania
3. Traffic conjestion--Transportation card
4. Industrial development card in Metropolica
5. New Steel Plant construction and location site
6. Education card--location of new university
7. Construction of regional airport
8. Incorporation Card
9. Election Card
10. Cost of utilities increase
11. Crime increase
12. Tax collection card

13. Proposition 13 card

14. Citizens' Advisory Group election card

After a card was selected from the above group, an explanation was given by the instructor concerning the details of the situation. Each group was then given conference time and allowed to report to the entire class. When the card required decisions to be made, reports were given to the class after decision votes were taken. The incorporation card was significant in that all the aspects and ramifications of expanding urban areas and their impact on smaller suburban and rural areas were discussed and analyzed and eventually voted on by all members of the class as related to the smaller towns represented in the simulation.

Each city or town was given a working budget based on proportional population differences between large cities and small towns. The budget was to be used in relation to costs presented by the urban growth cards.

A brief summary of the simulation follows:

1. Introduction by instructor of simulation.
2. Materials distributed to class and role assignments and budgets were given to each student. Class rearranged into groups.

3. Each group elected a mayor to represent that group.
4. The mayor of a group selected a growth card which was read to the class. All information regarding growth cards was given by teacher orally to the class.
5. Each group was allowed conference periods or time to discuss the implications of the growth cards.
6. The mayor of each group would present the conclusions or decisions of that group to the class.
7. Meeting periods were allowed between groups to confer on matters affecting the towns and cities.
8. When necessary, required votes of the class would be taken or public statements allowed.
9. After a completed round another growth card would be selected and procedures repeated.

The simulation lasted four days and the fifth day was used for debriefing. The simulation was specifically designed to include all aspects of a simulation activity. These aspects may include role playing, relationship to the real world, a level of competition and being student centered.

Simulation--Treatment II

Sequent Occupance

The second simulation activity was introduced during week seven and consisted of the same basic form as the first simulation activity. A review of the basic outline of this activity follows.

The class was divided into five groups of seven students each. The five groups were: city council, middle class, Andersonville (lower-class neighborhood), small business group, and corporation interests. Each group was given a budget, role sheet, map of Americana and directions from the instructor. Americana was the name of the hypothetical city in which the simulation was to occur.

Each group selected a community leader, business director, etc., to be spokesperson for the group. A series of urban situation cards were developed. The cards consisted of the following topics:

1. Tax collection card--tax increase of 11 percent
2. Inflation card--inflation increases 9 percent
3. Small business tax
4. Police strike

5. Olympic stadium site to be selected
6. Purchase of new city-sanitation equipment
7. Land value card.
8. Formation and location of new business
9. Proposal to clean up San Trojan river
10. Tax rebate
11. Election of City Council
12. Tax collection--federal tax
13. Relocation card
14. Small business improvement
15. New school needed in Andersonville community
16. Construction of new expressway

The relocation card was the key card related to sequent occupance. This card called for land negotiation as well as city council decisions related to urban renewal, urban development, urban construction and the impact of these on neighborhoods in Americana.

The stages of the simulation are presented below:

1. Students were assigned to groups and given budget and role information.
2. Group leaders were elected by group.
3. Group leader selected urban situation card.

4. All groups discussed situation card and impact on neighborhood, etc.
5. Each group presented its decision and statement to the class.
6. Groups responded to each public statement.
7. Negotiation time was allowed for groups to confer.
8. Class votes were taken and budgets altered.
9. All neighborhood, industrial or construction changes within city were recorded on maps of Americana prior to selection of next urban situation card.

This simulation lasted four days with the fifth day being used for debriefing and review.

A P P E N D I X C

SAMPLE QUESTIONNAIRE AND REVIEW SHEET

Sample Questions

Below are 25 sample questions. Would you read each and in the space at the left write the number indicating the level of question asked. Please use the following key:

1. Memory level
2. Translation level
3. Interpretation level
4. Application level
5. Analysis level
6. Synthesis level
7. Evaluation level

_____ 1. What is the population of Austin?
_____ 2. Does Austin have any pollution?
_____ 3. Who is the mayor of Austin?
_____ 4. Do all downtown areas have the same problems as Austin?
_____ 5. Could you explain what spatial interaction is, I didn't understand it?
_____ 6. Does Austin have the chance to become as large as Houston?
_____ 7. Where did the name Microville come from?
_____ 8. If centerville has some land, why couldn't they rent it to the city?
_____ 9. When are we going to vote on the issue?
_____10. Why do you all want an airport anyhow?
_____11. How much will a strike cost?
_____12. Explain to me, I don't understand what the roles of a Citizens' Advisory group is?
_____13. What do you think, should Centerville join Urbania or not?
_____14. Would an increase in crime cause our taxes to go up?
_____15. Can we find why certain places in Austin are built where they are?

____16. Are there certain creeks in Austin that are polluted?
____17. Why are they polluted?
____18. Where do the upper-class people in Austin live?
____19. What do you mean by speculation?
____20. Is speculation like investing your money?
____21. Austin utility rates are very high, aren't they?
____22. Why are houses on the east coast so expensive?
____23. Is it more expensive to live in Austin or New York?
____24. What things cause some cities to grow faster than others?
____25. What is the function of Houston?

I have also enclosed a copy of the first chapter of Sander's book titled Classroom Questions--What Kind? He briefly summarizes each of the seven levels of questions and you may find it helpful.

The following is a brief review of the seven categories of the Taxonomy of Questions based on the work of Norris M. Sanders. For each of the seven levels a definition and samples are included.

1. Memory level--Student asks a question which calls for a simple definition or restatement of material.
   Examples:
   1. What do the Navaho Indians call their houses?
   2. What shape are the Navaho houses?
   3. What is the size of Austin?
   4. What is the population of the United States?

   The above often occur after the student has already read or has heard the answer in a lecture at a previous time. The question may be asked to seek a simplistic answer usually based on specific facts or factual data.

2. Translation level--Student asks a question in which information is sought at the same level but in a different symbolic form or language.
   Examples:
   1. Could you explain, in a different manner, what that chart means?
   2. I don't understand what urbanization really means?

   Note: the classic teacher translation question to a student is, "Now answer that question in your own words." In effect, a translation question from a

student is asking for an idea or concept to be translated into another form of communication--but at the same level.

3. Interpretation level--Student asks a question seeking relationsip among facts, generalizations, definitions, values or skills.
   Examples:
   1. What are the major differences between Austin and Houston?
   2. How can Austin and San Antonio combine interests and efforts to construct a regional airport?
   3. Is it correct to call a war between two independent countries a revolution?
   4. Why is it unreasonable to call a war a revolution until it is completed?

4. Application level--Student asks a question which relates to a problem that approximates the form and context in which they would be encountered in real life. This question indicates a level of transfer that has taken place relating concepts, ideas, etc., to the real world.
   Examples:
   1. After studying and discussing Microville, would Austin have the same general problems and issues regarding growth?
   2. Would the hypothetical situation that we have been discussing apply to Austin?
   3. Is the issue of urban coalescence, as we discussed it in class, similar to what is happening in Houston?
   4. What can a city like Austin do to avoid serious problems related to urban expansion and rapid growth?

5. Analysis level--An analysis question is more complex than all previous questions. By definition, it requires the solution of a problem in the light of conscious knowledge of the aspects and processes of reasoning necessary to ask such a question. This may be a difficult type of question to identify, since it calls for a conscious knowledge of the thought process involved. This level goes beyond the common sense levels in interpretation and application.

Examples:

1. What is the reasoning or logic behind the passing of Proposition 13?
2. The mayor said, "Unless the bond issue passes, Austin will have serious problems in the future."
3. After reading or hearing the statement, "Austin is destined to follow the path of other American cities unless rapid changes are made," I was unable to understand the logic behind it. What is the reasoning behind such a statement?

In the analysis question, the student is going beyond factual, common sense answers and seeking some understanding behind the rationale of the issue.

6. Synthesis level--The student asks a question that indicates a level of original or creative thinking while seeking the answer to the problem. This type of question is generated in a classroom atmosphere that seeks and rewards inquiry and originality and allows for the open seeking of answers and solutions to the problems.
Examples:
   1. If the bond issue in Austin fails, what alternatives or suggestions are possible?
   2. What would happen if the city of Austin was not able to incorporate surrounding communities?
   3. How can a city like Detroit, with all its problems, be rejuvinated?
   4. What courses of action are open to the Federal government to help the rebirth and development of Urban America?

7. Evaluation level--A question is asked seeking a judgment of good or bad, right or wrong, according to the standard designated by the student.
Examples:
   1. In 1999 the U.S. will give up the Panama Canal. Should the canal be given away?
   2. Was the U.S. position in Vietnam justified?
   3. Should the city of Austin continue to support and pay its share of the South Texas nuclear development project?
   4. Should the city of Austin incorporate West Lake Hills into the city?

A P P E N D I X D

SETS OF SAMPLE QUESTIONS FROM EACH WEEK OF THE STUDY

Site: Week One—Friday, September 8

___1. How big is Austin?
___2. What is the latitude and longitude of Austin?
_P_3. Should we write that down?
_P_4. How do you spell that?
___5. Austin is near the Hill country--isn't it?
___6. Was Austin built here because of the Indians?
___7. Did Austin ever have a fort?
_P_8. Will that be on the exam?
_P_9. Will a map also?
_P_10. When is the exam?
___11. When was the site selected?
___12. Is that when it became the state capital?
___13. Did they settle here because of the Colorado river also?
___14. Could large ships ever use the river?
_P_15. What did you say?
___16. There were a lot of reasons why they selected this site--right?
___17. Who was Stephen Austin?
___18. Austin has a good site--doesn't it?
___19. Who was the president then?
___20. Was Austin's site inside the state more important than Houston's on the coast?
_P_21. What did you say--will you go over that again tomorrow?

Function: Week Two—Monday, September 11

P 1. Why don't we just have map exams instead of the other stuff--just take map tests?
P 2. Will there be a map section on the six-weeks exam?
P 3. Do you know of anywhere we can find out how to change fahrenheit to celcius?
4. If a city is a lumber city would the function of the city be lumber?
5. What is hinterland?
6. Are suburbs part of the rural area?
7. Would suburbs be in between a city and a rural area?
8. Is a hinterland dependent on the city?
9. What would a dealer in a small town get, why would he do anything?
10. How come whenever you see a big map, Houston and Dallas are always bigger than Austin?
11. What is the function of Houston?
12. Houston's main purpose is as an energy center, isn't it?
13. What about space and the Space Program and Houston?
14. Wouldn't shipping and energy be the same in Houston?
15. If they don't ship oil, what else would they ship at Houston?
16. Don't they have lumber in East Texas?
17. How much does lumber cost in East Texas?
18. How come we can't develop a new function for a city?
19. Wouldn't it be best if a city like Austin were to have more than one function?
20. Is the city of Austin growing?
21. What would happen if the city stopped growing?
22. Does the city grow--can it expand, does it always get larger?
23. If a city doesn't grow, what would probably happen to it?

Urbanization: Week Three—Monday, September 18

P 1. On the map, are all the places outlined in red?
P 2. Do we have to know that island on the test?
P 3. Do we have to know where all the other places are located also for the exam?
P 4. And the island, too?
P 5. How much will this project affect our grade?
P 6. What if you miss a day of reporting data in your report?
___7. Is the most common type of growth today around or in cities?
P 8. Can I sharpen my pencil?
___9. What does rural mean?
___10. Does that mean that we (in U.S.) have fewer farmers than any other country?
___11. Does that refer to all people in Austin being in an urban area?
P 12. What was the first factor about Austin you said?
P 13. What does that say on the board?
P 14. Is that factor part of Number 4 (the previous factor listed on board)?
P 15. Do we have to write that down?
___16. Is California the most urbanized area in the world or in the United States?
___17. Does it ever get down into the 30s in California?
___18. Is weather in Florida and California alike?
___19. Why do all the old people move to Florida?
___20. What kind of benefits do old people get in Florida?
___21. I went to Florida to visit my relatives and when I got there I was sick and dizzy all the time, how come it (Florida) made me dizzy?
___22. Is that how Houston is (referring to levels of pollution)?
___23. Isn't there a real large lake in Florida?
___24. Isn't air conditioning as expensive as heating?
___25. Austin utility rates are very high, aren't they?
___26. Is Austin very industrial?
___27. What is the fastest growing city in the country?
P 28. Does that statement refer to Austin?
___29. Where was it real cold last year?
P 30. What does that mean on the board?
___31. Does Austin have any pollution at all?

___32. Austin housing is much lower than Houston, isn't it?
___33. Why are houses on the East Coast so expensive?
_P_34. Should we draw that diagram?
___35. A rich person can afford it--how much money does he make?
___36. Is it more expensive to live in New York or Washington, D.C.?

Spatial Interaction: Tuesday—September 26

P 1. Can you give just the people that need to take a make-up test another test?
P 2. Will there be a map section on our next exam?
P 3. Will you show our exams or tests to our parents?
P 4. Are you going to explain that concept today?
P 5. What does that say on the board?
6. I don't understand what the purpose of that is--what do they do?
7. What is the definition of function?
8. Did you say as a city increases in size so does the interaction?
P 9. What did you say?
10. Does an increase in size cause an increase in spatial interaction?
11. Does interaction increase as the size of the city increases?
P 12. How do you spell that?
13. What would happen if it became a larger city?
14. Why is it always busy inside a city?
15. Does the size--large or small--mean that it affects the spatial interaction of the city?
P 16. Wait, can you say that again?
17. So, is that the difference between the two points?
P 18. What is that on the board in the middle?
19. Why would interaction affect the growth of a city?
20. No, I don't understand why you had to do that?
21. Will you explain that and do it again?
22. Now, what does this deal with?
23. What is all this related to, interaction and city size?
24. Is that really true, or are you just guessing?
25. Is there that much activity in a city?
26. Is that the real amount of interaction?
27. Are you saying that is how much activity there is and then it will increase?
28. I still don't understand--what does it mean?
29. What does saturation mean?
30. How can you determine the actual spread or interaction?
31. Are you making those up?
32. When does that take place?
33. If it drops--the spatial interaction, what does it mean will happen?

Urban Ecology: Week Four—Monday, October 9

P 1. Why were these wrong?
P 2. How much does this count for our grade?
P 3. How much will the final count?
P 4. Is that a passing average?
P 5. We don't need our report do we?
P 6. When will we have the next test?
___ 7. Are there physical factors that affect urban ecology?
___ 8. Are we going to study Urban Ecology this week?
___ 9. Are they different things--Urban and Ecology?
___ 10. Is that still part of ecology?
___ 11. What does aspect mean?
___ 12. What aspects of the city has ecology affected?
P 13. What is that word on the board?
___ 14. Is that statement relative to number two on the board?
___ 15. Does the assignment deal with one city?
___ 16. The nuclear energy plant would be an example--wouldn't it?
P 17. Should we draw the diagram?
P 18. Will it be a vertical diagram?
___ 19. How many miles thick is it?
P 20. What is it called?
___ 21. What is Ecology?
___ 22. Austin is near a fault--does that affect it?
P 23. What is that word?
___ 24. Does the ecology of a city mean the city is clean?

Urban Coalescence: Week Five
Tuesday, October 3—Treatment I
Simulation Activity

___1. No, we are the people that do not want it?
___2. Big Deal with the big industries--I don't understand what that matters?
___3. Could Urbania force Microville to become part of Urbania?
___4. What do you think?
___5. In their situation, is it a question of cities joining cities or a matter of building an airport?
___6. How about traffic or crime?
___7. Now, if Urbania takes over Microville where will all the extra stuff like food come from?
___8. What is the reason you want a new regional airport?
___9. Why can't they just build this airport at some other point?
___10. Why don't you just expand your own airport, we don't need an airport here?
___11. Why can't they just buy other land around the city?
___12. Why can't you expand the Metropolica Airport?
___13. What this means is they want to take them into their city and change their name--right?
___14. That's not fair, won't they get it either way?
___15. Wouldn't a real small town have less taxes, if Microville joined Urbania would the taxes shoot up?
___16. What about county funds?
___17. So, are you saying that the state should decide if an airport is built?
___18. Are Centerville and Urbania in the same county?
___19. If Centerville has some bad land why couldn't they sell or rent the land to the city?
___20. Would an increase in crime cause our taxes to go up?
P 21. Do we put all these reasons together into one major statement?
P 22. Are you going to write this all down?
___23. Might this bring in bigger business into the area?
___24. Could new businesses come in because of the airport?
P 25. Who is next?
___26. Is this an argument or a debate?

___27. I don't understand what they keep saying about an increase in crime rate from an airport?
___28. Explain to me; I don't understand exactly what the roles of a citizens' group is?
___29. Where do you all live at?
___30. What do you think, should Centerville join or not?
___31. Maybe we just should say to Metropolica to leave them alone and to build the airport somewhere else?
___32. What do you think about that?
___33. All they really want is just an airport--right?
___34. Do you all want them to join your town or just to build an airport?
___35. Are they going to keep the city, keep the same names, join in the city--I don't understand?
___36. Alright, what they want is some of Centerville's land--right?
___37. They don't want to bring them into their city and make them change their names--right?
___38. Do we get any money?
___39. If it's bad soil, can't you sell it to Metropolica?
_P_40. A crime rate--what did they just have in Urbania?
_P_41. O.K., now what are we supposed to write?
___42. The crime rate went up 25 percent?
___43. Do you all understand what I'm saying?
___44. If they do join it might make things worse?
_P_45. What are you doing?
___46. What are we reading this for--for what?
___47. Why should the crime rate change because of an airport?
___48. Whose land is it in the first place?
___49. What is Microville doing talking to those people?
___50. But, what is the benefit in the first place to us?
___51. Well, if there is no real reason to need it, why are we doing this?
___52. How much money for the budget are we getting?
___53. When are we going to vote?
___54. Why not say that?
_P_55. Isn't that number six hundred million?
___56. Aren't we supposed to get our total city budget?
___57. What if we pick one of those and it is against ourself?
___58. You want us to figure that out?
___59. Wait, now what was the problem?
___60. I don't understand how it will affect everyone else.

P 61. Oh, I just don't know?
62. How much will the strike cost--five thousand a minute?
63. Do we have to figure out what is going to happen, or what are we supposed to do?
64. Is it, the statement, supposed to be that long?
65. Could we just say the same thing again?
66. Why is it up to them to make us join their city?
P 67. Did you get that?
68. Well, how are we supposed to know about that?
69. How are we supposed to know if they have higher taxes?
70. Why do you all want an airport anyhow?
71. Why do they want us to join?
72. Why can't they just buy the land?
73. Will each group select one?
P 74. What are you laughing about, it is not that funny?
P 75. What should we write down?

Sequent Occupance: Week Seven
Treatment II—Monday, October 16
Simulation Activity

P 1. What do we do?
2. O.K., do you all think we should stay there or move?
3. What do you think?
P 4. What?
5. What is Colorado Heights?
6. How much money should we ask the city council for?
7. Our area is poor isn't it?
8. How much should we ask for?
9. We could put some of our money into advertising, don't you think that would be good?
10. Are we supposed to represent the poor?
11. What can we do with our business?
12. Does this factory have pollution also?
13. Where should we build our factory?
14. What is the C.B.D.?
15. O.K., we don't want to put the factory near middle-class housing, do we?
16. We want it there--why?
17. Why don't we want it near other factories?
18. Where is Andersonville?
P 19. What does that mean?
20. What about the middle class--how would they like it?
21. Who would come to the factory if we build it in an area of high crime and pollution
P 22. What did he say?
23. That is not a site in the middle-class area, is it?
24. Who are they--what group do they represent?
25. Why are you against us building the factory?
26. Did they want to move toward Colorado Heights?
27. O.K., if we built that factory where we want to, wouldn't it make money for the city?
28. How, why do we want to put it there, we need to figure it out--right?
P 29. O.K., where is the highway on the map?
30. O.K., what about the city dump, what can they do about the dump?
31. How come you know those factories are not to be used that much?

___32. What do they want to do with that factory, pollute the entire city?
___33. What's this about a new site?
___34. Do they want to build that factory in the middle-class area?
___35. What kind of factory do they want to build?
___36. What do you think, the garbage is piling up?
___37. How can they do that?
___38. O.K., what can we say about the crime rate?
___39. If there is a serious police strike would the national guard come in?
___40. This is our neighborhood and we don't want to leave--right?
___41. Our taxes have increased, but what city services have we got?
___42. O.K., what other problems are there?
_P_43. What else?
___44. Any other things we can add to our list for the city?
___45. If there was a police strike, how much would it cost?
___46. Do they want to put that thing (factory) here?
___47. Why wouldn't it be a good idea to build it near the center part of the city?
___48. We don't want it (factory)--right?
_P_49. Can I have one of those maps?
___50. Where is the police department located?
___51. What does C.B.D. stand for?
_P_52. What did he say?
___53. Andersonville has an expressway--right?
___54. Is Andersonville the name of the expressway?
___55. Is that where they want to build the factory?
___56. What do you think?
_P_57. What does that mean on the map?
___58. Why couldn't they just move around to the other side of the C.B.D.?
___59. Well, why--is Andersonville a separate town or what?
___60. Is Andersonville a town or neighborhood?
___61. Is it like an area like Northwest Hills in Austin?
___62. Is it going to cost us a lot to sponsor the Olympics?
___63. Does the new stadium have to be built in Andersonville or can we build it someplace else?
___64. Well, how about this other area?

___65. Does an old area mean it's a slum area?
___66. Would it have more traffic?
___67. What would we tear down if we built it in Andersonville?
___68. We need to know more--what is Andersonville, why don't they want it (stadium) built there?
_P_69. What is all this on the map?
_P_70. Where?
___71. How do we know what Andersonville feels about all this?
___72. We know they are against it (stadium construction)--but why?
_P_73. Is there a group that represents Andersonville?
___74. What about the University--we can't move that can we?
___75. Why is there a dump in the center of a city?
_P_76. Where?
___77. What do you need a dump for?
___78. Are they going to ask the city council for things?
___79. Well, that group does not even live in Americana--right?
_P_80. Which group is that?
___81. If they are in such good shape, why are they asking for help?
___82. So, do they want to move?
___83. What do they want to ask the city council for?
___84. What did the city council do to make them mad?
___85. Do you want to move your business somewhere else?
___86. Why doesn't the city council forget about building the new expressway?
___87. Did they say what kind of factory they want to build?
___88. Does it give off fumes or pollution?
___89. Does the middle-class area want it (factory)?
___90. Is there space or room for it there?

Urban Planning: Week Eight—Wednesday, October 25

P 1. How many days of class are there?
P 2. Will we finish everything you said by the end?
3. Could you define urban planning again?
4. How many ways could a city be planned?
5. Are any of the cities in Texas planned?
6. Are any in the U.S.?
7. Who planned Washington, D.C.?
8. When was it built?
9. I have been to Washington, what was planned about it?
10. Were the streets planned?
11. What is the advantage of planning a city?
12. Would traffic be an area that could be planned?
13. How about pollution--could you plan a city to eliminate it?
14. How could you do it?
P 15. Could you say that again?
P 16. Is that what you wrote on the board?
P 17. Should we put it in our notebooks?
18. How did they plan Reston?
19. Has it worked, is it a better city than the other ones?
20. Did anyone ever plan Los Angeles?
P 21. What city?
22. Who designs all these plans and ideas?
23. Does The University of Texas ever help Austin?
24. How, what can a university do?
25. What kinds of problems cause cities to do planning?
26. Does Austin have any of these problems?
27. What is Austin's worst problem?
28. Can Austin correct it?
29. Would it have to be that way?
P 30. Is that on the board?
P 31. Explain it again, please?
32. Was MoPac expressway planned?
33. When was it planned?
34. Could that be done again?
35. Are new suburbs planned?
P 36. What was the name?
P 37. I missed that, would you go over it again tomorrow?

Areal Association: Week Nine—Friday, November 3

___1. What are associated goods and services?
___2. What are related services?
___3. Is that the same as spatial interaction?
___4. Does areal refer to area of the surface?
___5. Do you mean if all the students or teachers didn't come to school that service would break down?
___6. Why don't they do that?
_P_7. Do we have to draw that?
_P_8. Did we finish all the reasons for areal association that we started yesterday?
___9. Are you referring to shipping of goods?
___10. What does mass transportation mean?
_P_11. Could you say that again?
___12. Certain services like police and fire protection are part of areal association--aren't they?
___13. Services flow as well as goods--right?
___14. Does areal association only take place in the city?
___15. Have services broken down in any cities?
___16. Is that what happens with a strike in a city?
_P_17. What does that mean?
___18. How many services does a city offer?
___19. Do they (services) change very often?
___20. Are all these services paid for with taxes?
___21. How are taxes paid?
___22. Who determines how much you pay?

Urban Synthesis: Week Ten—Wednesday, November 8

P 1. Do you have the tests corrected?
2. What are the reasons some people vote along party lines in Austin?
3. Which of the two parties is more conservative?
4. How did the election go?
P 5. Are we going to have another test before the final exam?
6. Is this still considered an area of spatial interaction?
P 7. What does that say on the board?
8. How does that happen?
9. Why do neighborhoods change?
10. What does economics have to do with it?
11. Does this have to do with urban synthesis?
P 12. Is this supposed to be an urban concept?
13. How large can a city like Austin get?
P 14. What was that?
15. What is an urban community?
16. Large cities are located on the Gulf and Atlantic coastal plain--right?
P 17. Will there be a diagram?
18. What about cities on the Great Plains?
P 19. Do we need a full sheet of paper?
20. Are those American or Canadian cities?
21. Is that for East Coast cities?
22. Do you mean the size of Austin is increasing faster than Houston?
23. Is Boston part of the Eastern Megalopolis?
24. How large is it?
25. Is fishing an important function for Boston and other cities on the East Coast?
26. Was the site selected for fishing?
27. Will areal association change depending on the site?
28. Is a particular life style created in the Northeast?
P 29. What was the last thing you said before that?
30. Are all urban activities organized to help the city grow?

A P P E N D I X E

EXPOSITORY LESSON

Sample Expository Lesson

The following excerpt is a sample of expository lessons used in the study. This represented a portion of a lesson focusing on the concept of site.

There were several factors that influenced the site of Austin. These factors were both physical and cultural. The primary reason Austin is located at the present site is due to Stephen F. Austin. Austin believed that a major river port could be developed in the interior of Texas and this port could be as great and famous as New Orleans. He also believed that the Colorado River could become a major waterway for trade similar to the Mississippi. With these ideas in mind Austin moved to and settled on the present site that bears his name.

There were several other key reasons why this particular site was chosen. It was becoming increasingly clear during the 1830s and 1840s that a military outpost was necessary in the interior of the state to protect settlers from hostile Indians. Most of the Indians that posed a problem were located to the west of Austin during the 1840s. Austin was selected as this outpost for several physical reasons. These reasons included such physical factors as the Colorado River and the site, which

was at the edge of the Hill country. Austin was located along the Balcones escarpment where the coastal and interior plains meet the Hills.

There were still other reasons why this particular site was chosen. Mirabeau Lamar, an early Texas frontiersman and politician, wanted the capital of Texas to be at the present site of Austin. A famous story related the hunting expedition of Lamar in Austin in 1840. Lamar, visiting a friend in Austin and hunting one morning, sighted a buffalo herd several blocks from the Colorado River. He and several other men followed the herd on foot. After the herd had moved several blocks Lamar was able to shoot and kill one of the buffalo. The animal, according to legend, fell about where the present capitol building stands in Austin. When Lamar approached the dead animal he was impressed with the beauty and openness of the land. As he gazed out across the vast landscape he was said to have muttered a phrase calling for the future of Texas to be built on this site. The power of an empire would be located there according to Lamar. He did maintain this attitude during his entire political career. He was to work hard and long to have the capital of Texas located in Austin. Even when

powerful leaders such as Sam Houston were to challenge the right of Austin to be the capital of Texas, Lamar remained steadfast and as a result Austin is still the capital of Texas today.

So, it should be noted that both physical and political forces may be at work when the site of a city is chosen.

In Austin's case its location on the Colorado River and near the Hill country was crucial in choosing the site of the city. Cultural and political forces also were at work. The necessity of a capital in the interior of Texas was considered significant by some early Texans, with Lamar being the most vocal and active. A military post was also necessary for the security of the settlers.

Some city sites were selected for similar reasons and others for more diverse reasons. Cities such as New York, New Orleans, or Chicago were selected and developed because of physical features related to trade. All of these cities were and are located near large water bodies and at the mouth of rivers. These sites presented ideal locations for the development of trade, New York being the best example of the development of a major trade center.

Other cities have developed with their sites being selected and planned prior to any settlement taking place. Examples of these cities are Brasilia, the capital of Brazil and Canberra, Australia. The sites of both of these cities were selected for various economic and political reasons. But settlement was not spontaneous or based on physical factors related to site. In other words, these were planned cities and did not evolve or develop because the physical location or site was good enough to attract large numbers of people.

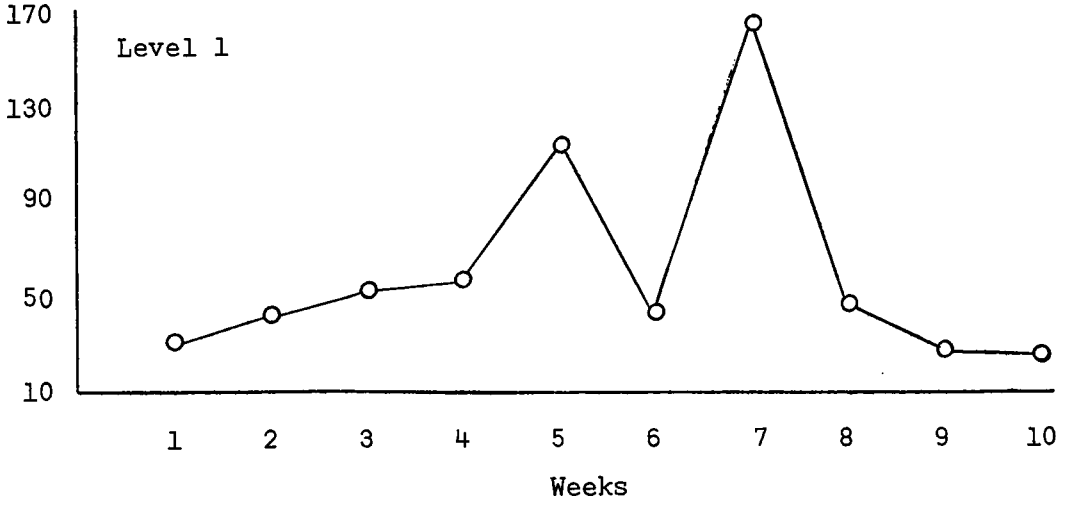
The site for Brasilia was selected with the specific purpose of attracting and drawing people to the interior of Brazil, the idea being the ultimate development and opening of the interior of Brazil. Along with this would come the discovery and development of the resources of the interior.

Canberra, Australia is an example of another planned city. The site of Canberra is exactly midway between Sydney and Melbourne. Since both of these cities wanted to be the capital it became apparent that a neutral site must be selected. Therefore, not to show any partial treatment, a site was chosen between both. After the site was selected a city was planned and built on the site.

So, there are numerous reasons why certain sites are chosen. These sites may reflect physical, political and cultural attitudes of a country.

A P P E N D I X F

TIME SERIES GRAPHS



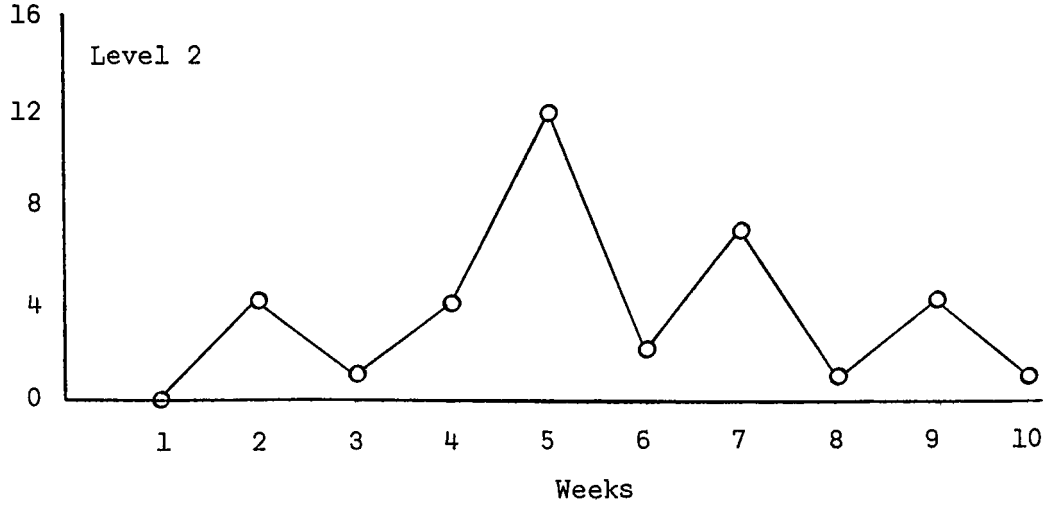
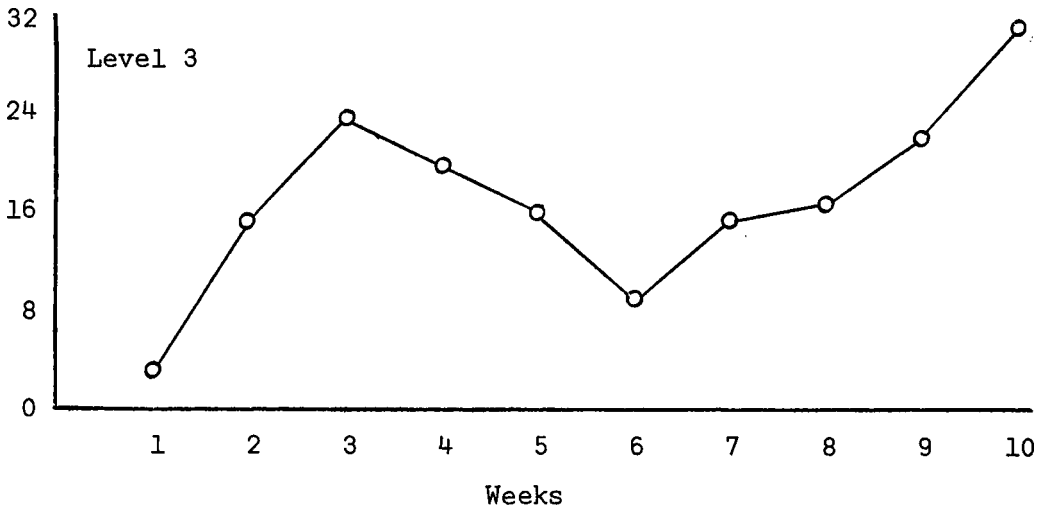
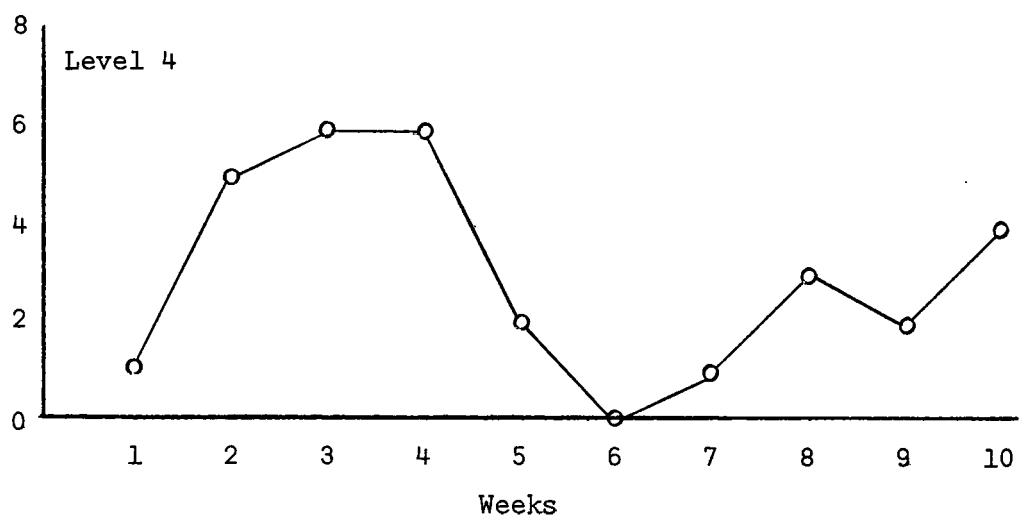


Figure 1

Number of Questions Asked by Weeks at Seven Levels





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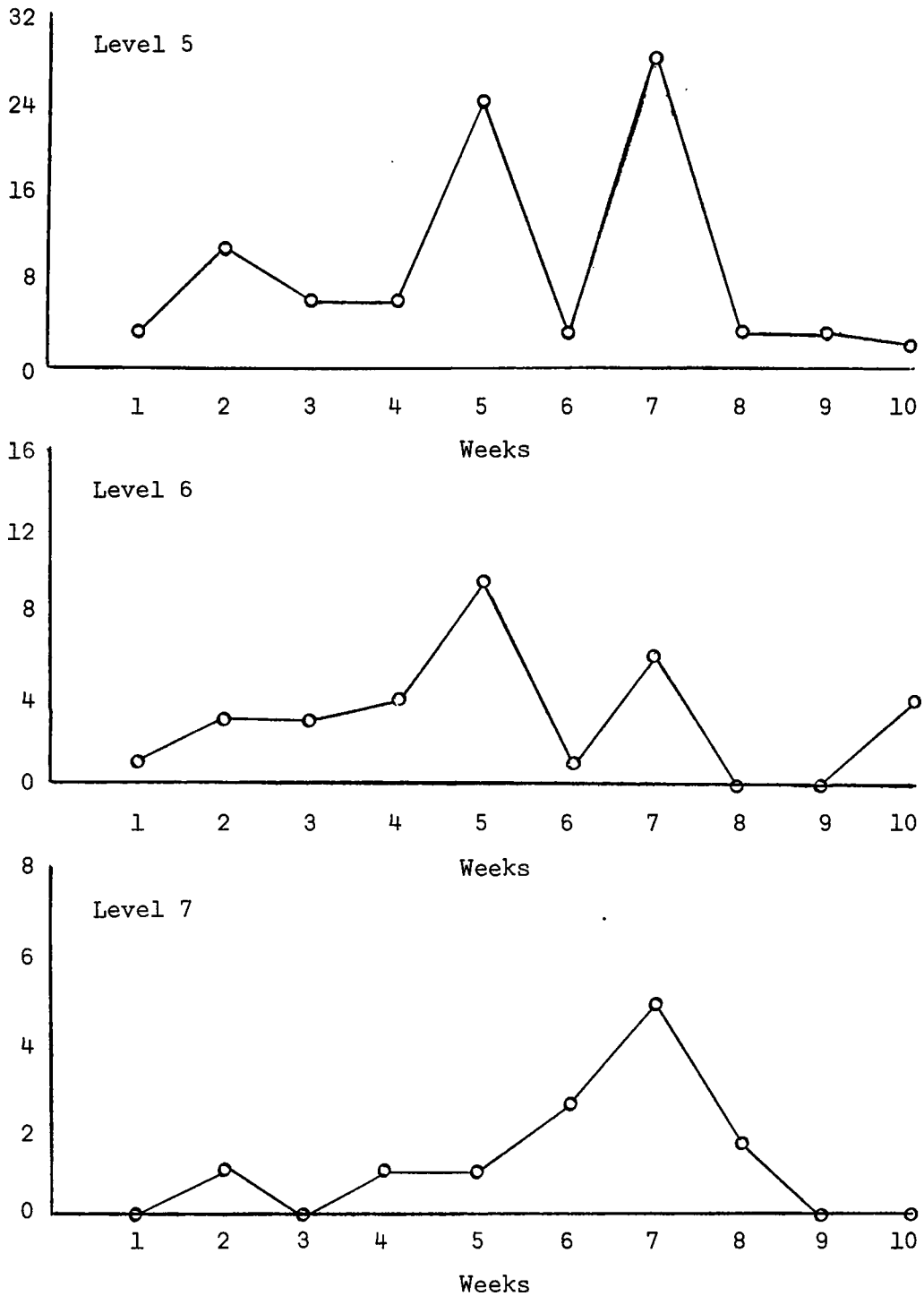

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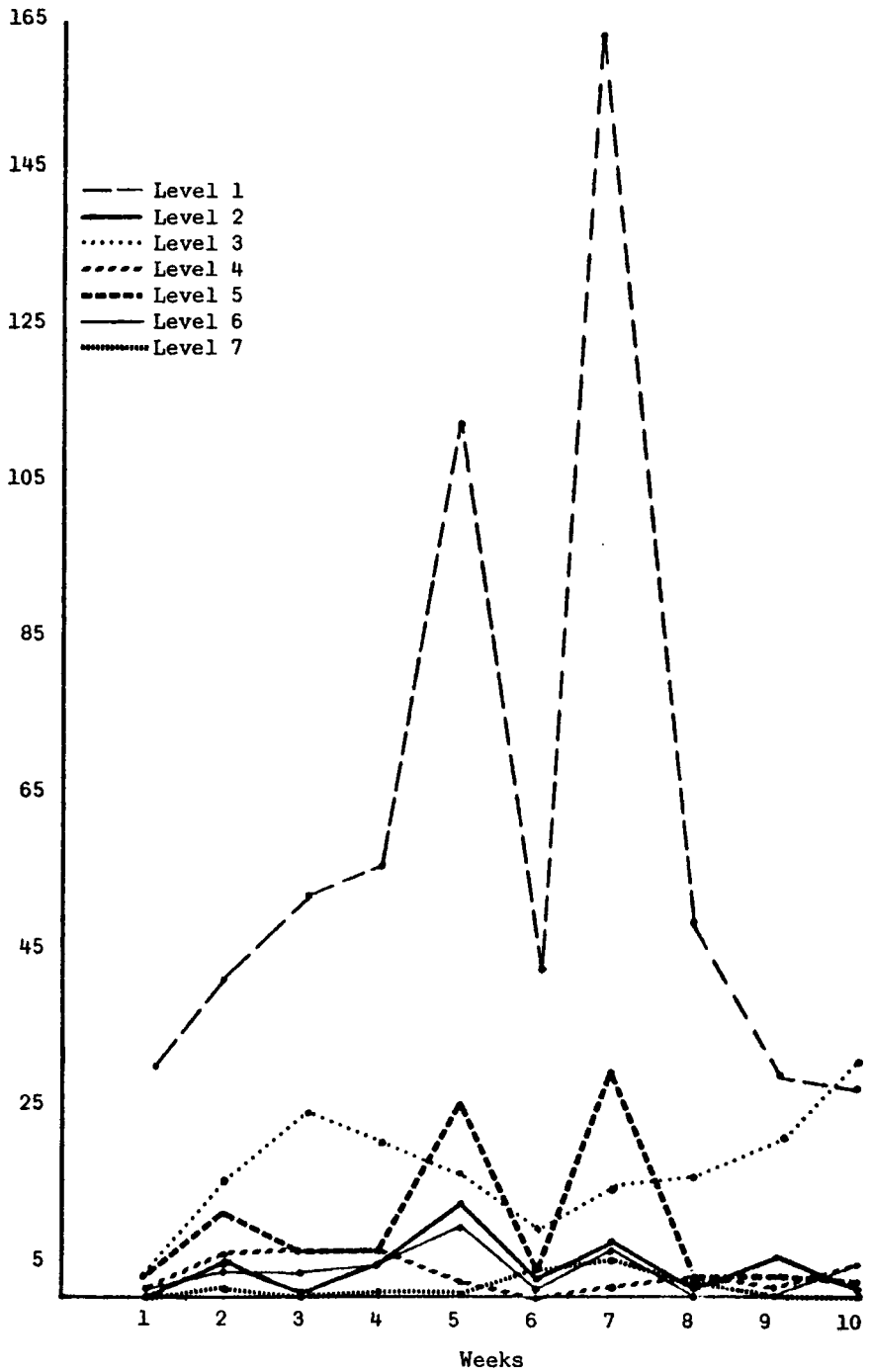


Figure 2

Number of Questions Asked by Weeks at Seven Levels

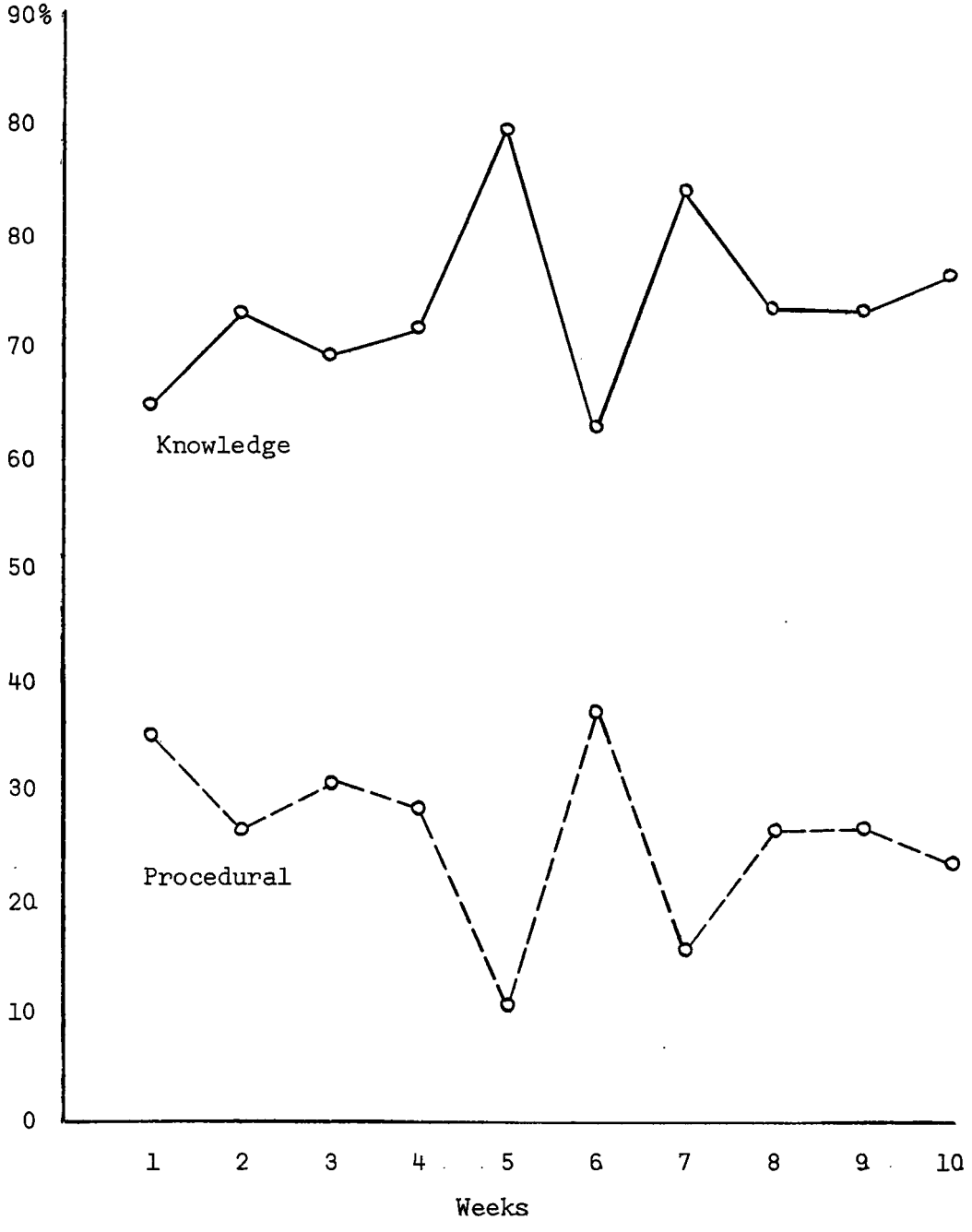


Figure 3

Percentage of Knowledge and Procedural Questions Asked by Weeks

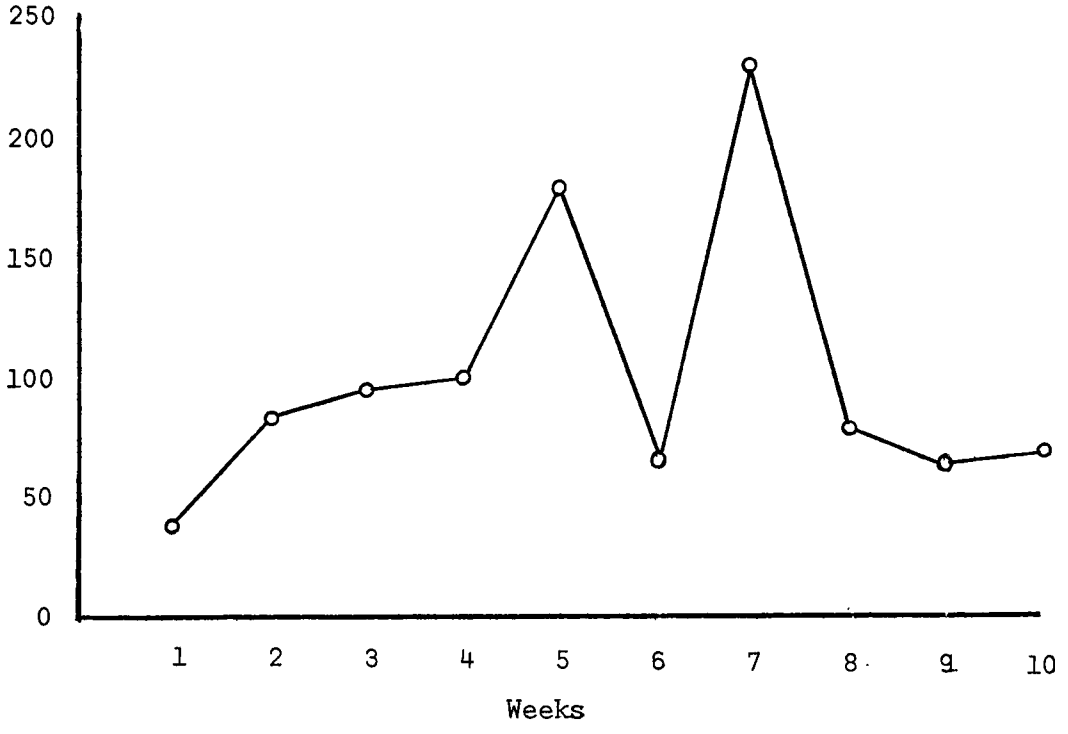


Figure 4

Number of Agreement Questions Asked by Weeks

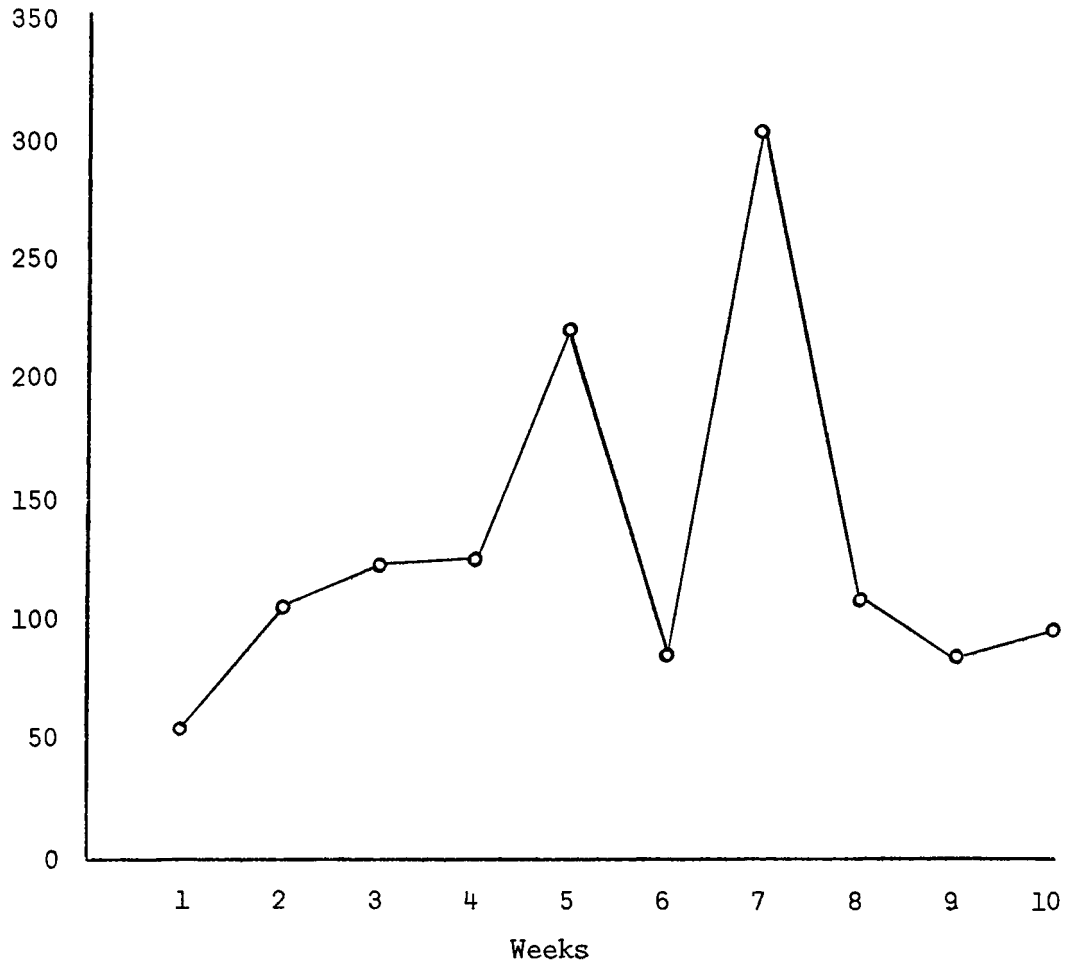


Figure 5

Number of Knowledge Questions Asked by Weeks

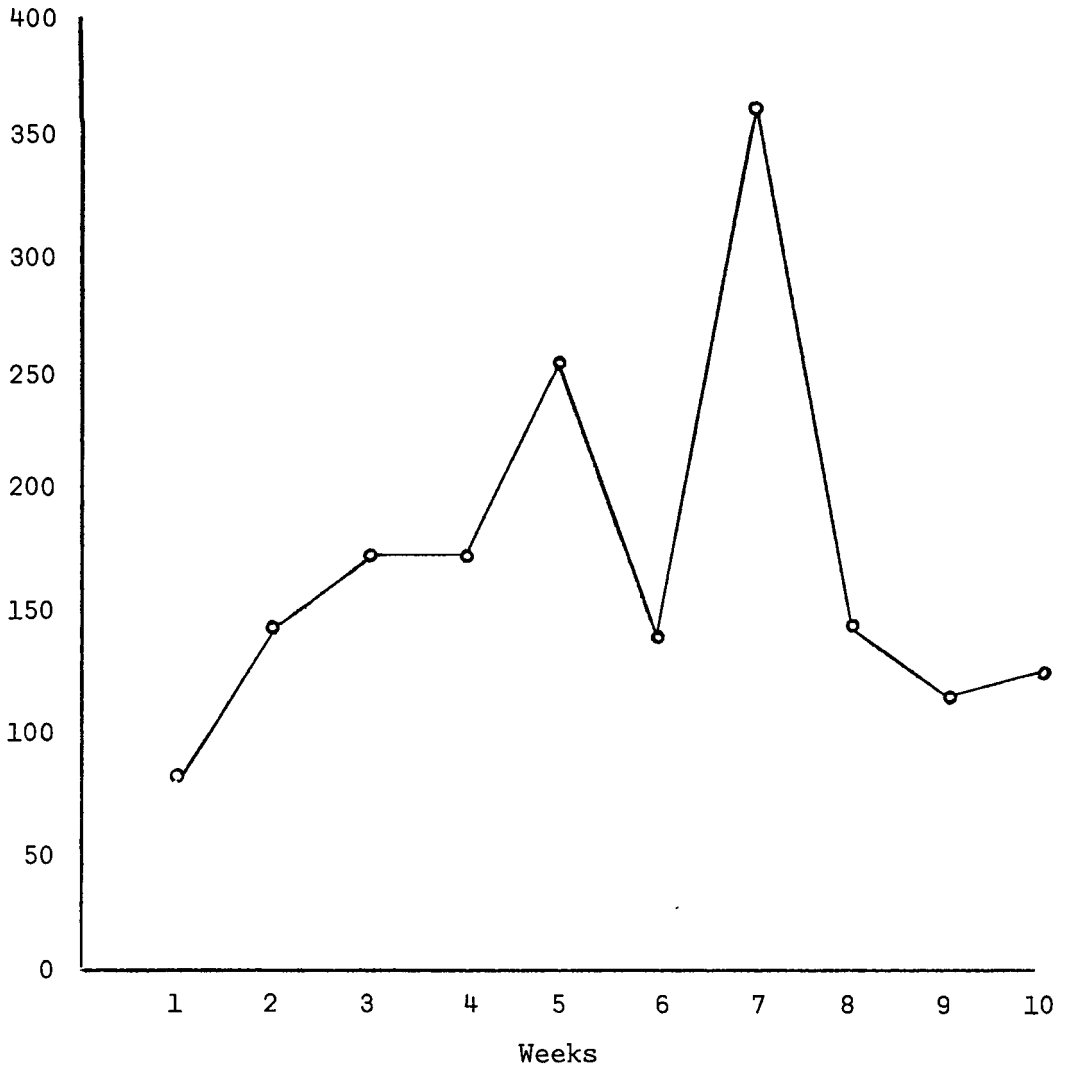
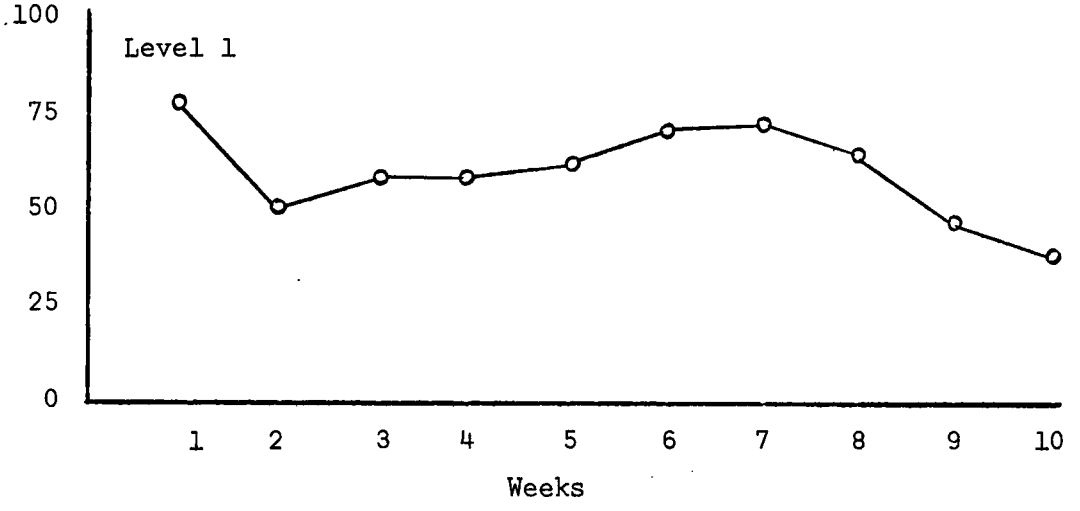


Figure 6

Number of Total Questions Asked by Weeks



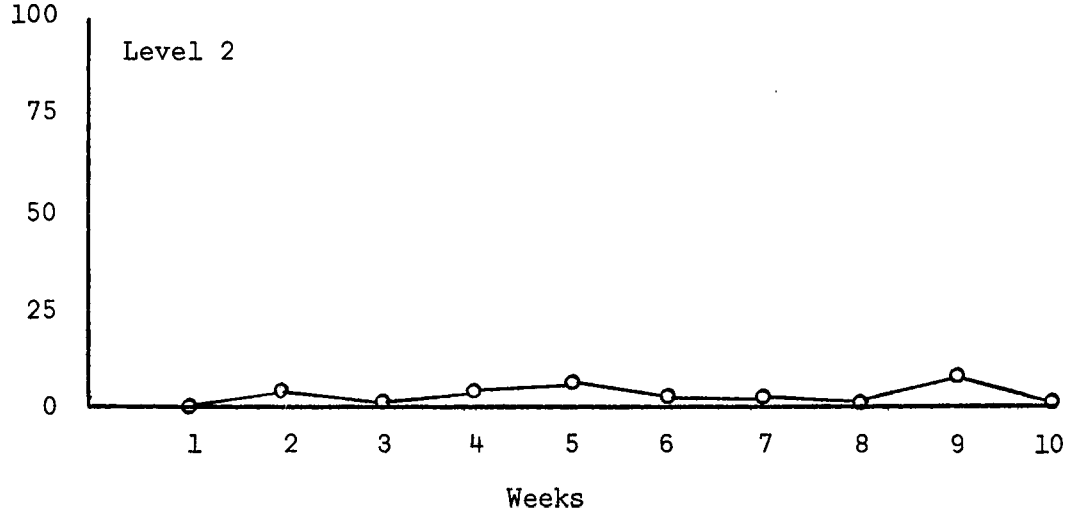
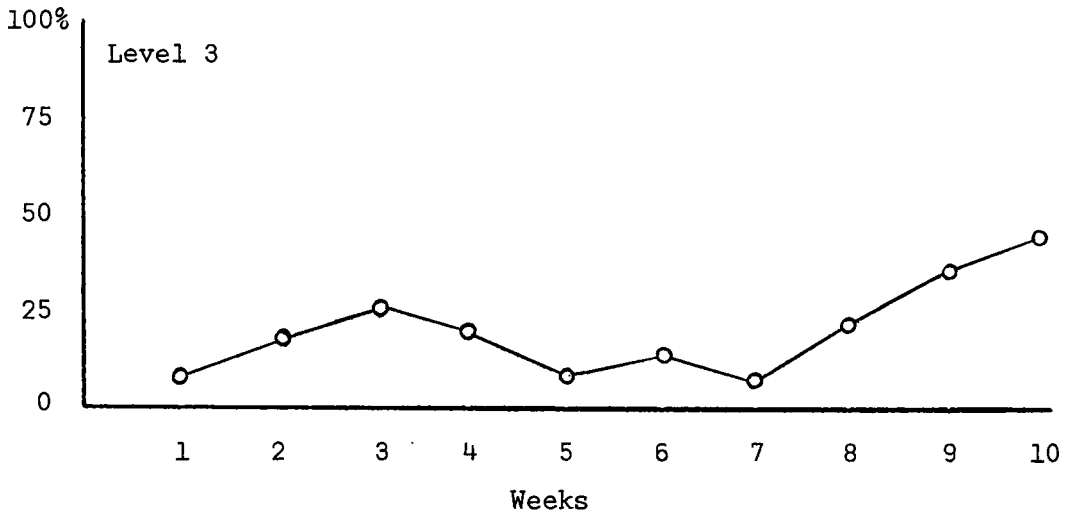
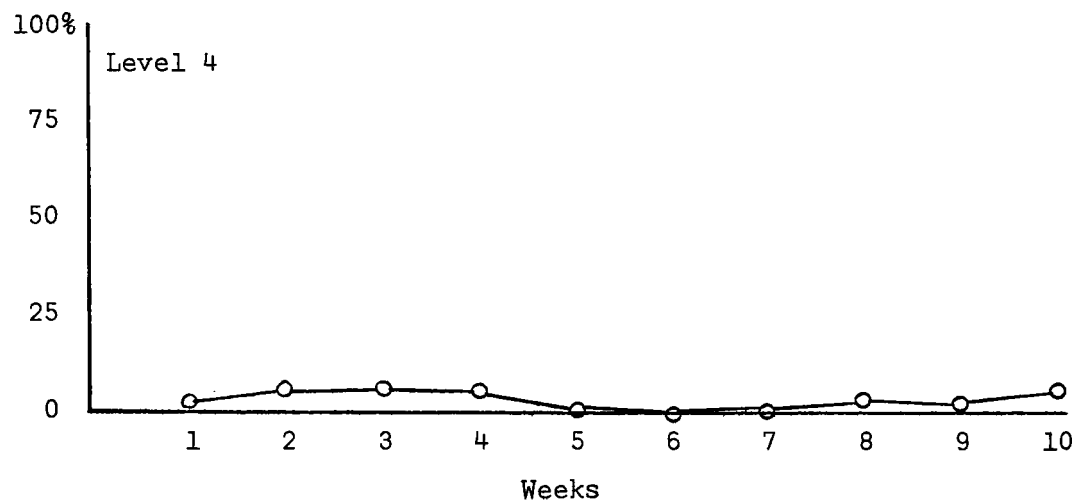


Figure 7

Percentage of Questions Asked by Week at Seven Levels





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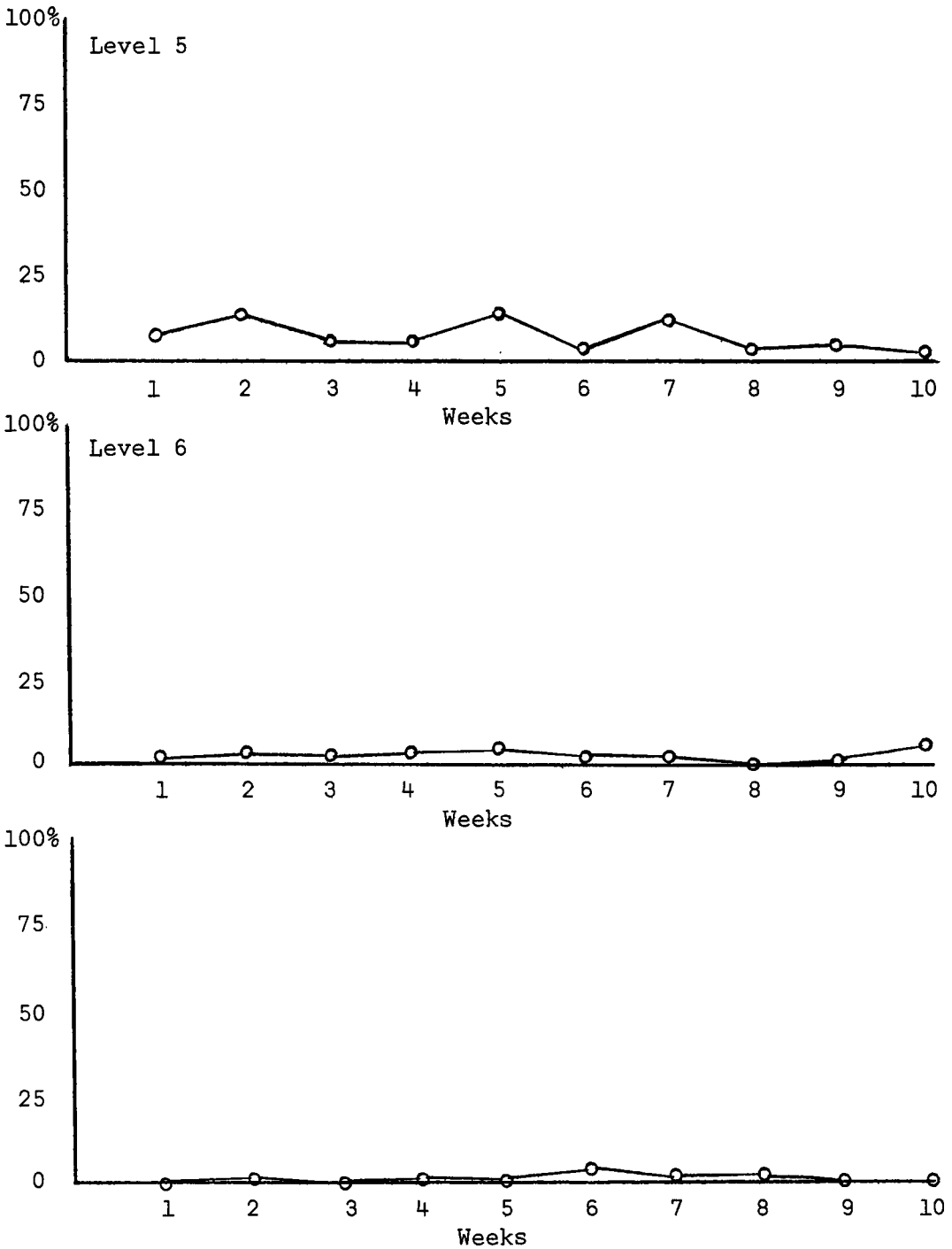
Percentage of Questions Asked by Week at Seven Levels



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Percentage of Questions Asked by Weeks at Seven Levels

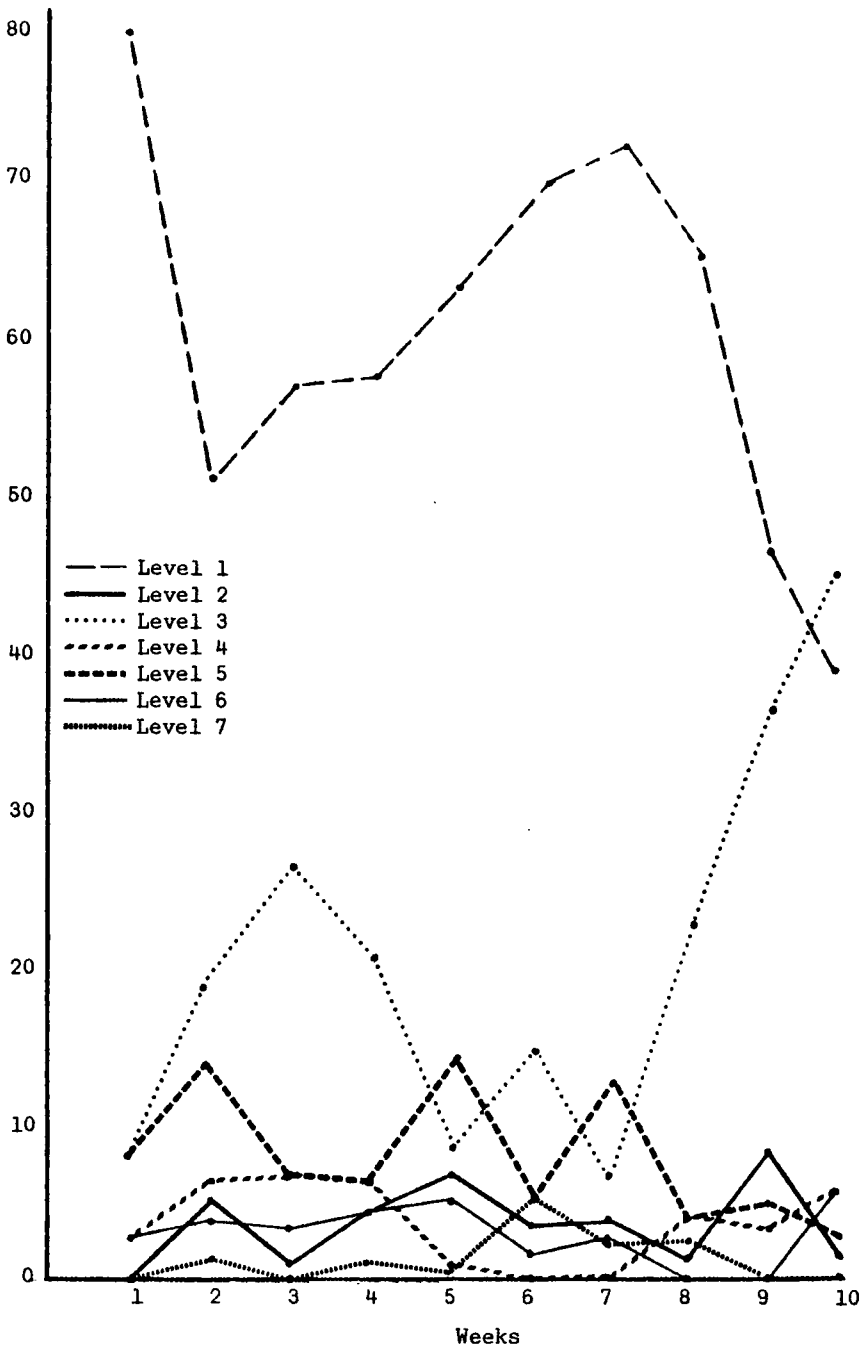

Figure 8

Percentage of Questions Asked with Agreement Question by Weeks at Seven Levels

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B I B L I O G R A P H Y

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