

CULTURAL ATTUNEMENT OF  
PROGRAMMED INSTRUCTION:  
INDIVIDUALIZED-GROUP AND  
EXPOSITORY-DISCOVERY DIMENSIONS

Thesis for the Degree of Ph. D.  
MICHIGAN STATE UNIVERSITY  
LOIS MCKINNEY  
1973



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## ABSTRACT

### CULTURAL ATTUNEMENT OF PROGRAMMED INSTRUCTION: INDIVIDUALIZED-GROUP AND EXPOSITORY- DISCOVERY DIMENSIONS

By

Lois McKinney

The research explored a series of questions arising from attempts to attune programmed instruction (PI) to a Brazilian milieu: (1) whether or not learning occurs through PI; (2) whether or not increases in cultural attunement of PI along individualized-group and expository-discovery dimensions facilitate learning; (3) whether or not the nature of the learners affects the degree to which PI facilitates learning; and (4) whether or not certain dominant characteristics of the learners affect the degree to which cultural attunements of PI facilitate learning.

The research subjects were 145 youths and adults (ages 14-75) who reside in the metropolitan area of São Paulo, Brazil. They were voluntary participants in a three-session course on nutrition. The mean years of schooling for these subjects was 3.7 years. Eighty-three per cent of them were employed in manual occupations with low social status.





Two versions of a programmed instruction unit on basic principles of nutrition were developed for this research. The versions were varied systematically along three dimensions of expository-discovery teaching: (1) the degree of guidance provided, (2) the ruleg or egrule sequencing of instruction, and (3) the didactic or Socratic style of instruction.

In addition, instruments were adopted, adapted, or developed to provide measures of learner characteristics and measures of learning. Learner characteristics (independent variables) examined in this research included literacy skills, modernity, and motivation to learn. Measures of learning (dependent variables) included content acquisition, transfer of training, retention of learning, strategies employed in learning, and affective responses to instruction.

The research plan called for a 2 x 2 factorial design with variations of instructional interaction (individualized and group conditions) on one dimension, and variations of program style (expository and discovery conditions) on the other dimension.

Data were gathered through observation and experimentation at sixteen test sites in the Greater São Paulo area, and examined through analyses of variance and simple and partial correlational procedures.

Six conclusions were drawn from the findings:

1. PI provides a promising tool for development education.
2. While adaptations of PI in the direction of group methods are not contraindicated, such adaptations appear to be relatively more productive for less modern and more motivated learners.
3. Adaptations of PI in the direction of discovery methods appear to be beneficial.
4. Highly literate, highly motivated learners achieve more through PI than less literate, less motivated learners, irrespective of cultural adaptations of the method.
5. Adaptations of PI in the direction of group and discovery teaching methods are relatively more productive for traditional learners than for modern learners.
6. Investigations of cultural attunement of instruction should (a) distinguish between attunement as a process and attunement as a product; (b) account for the complexity of factors involved in attuning teaching to culture; and (c) consider differences in learners' pedagogical expectations and preferences growing out of experiences within school and non-school environments.

CULTURAL ATTUNEMENT OF PROGRAMMED INSTRUCTION:  
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DISCOVERY DIMENSIONS

By

Lois McKinney

A THESIS

Submitted to  
Michigan State University  
in partial fulfillment of the requirements  
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1973

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To extension students  
in Latin America,  
with whom and for whom  
this research was undertaken.

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## ACKNOWLEDGMENTS

The author is grateful to the persons and institutions who made this research possible.

The chairman of her guidance committee and director of her dissertation, Ted W. Ward, provided unwavering support and insightful counselling at every stage of the research. The other members of her guidance committee, Cole S. Brembeck, Charles A. Blackman, and William A. Herzog, Jr., also offered encouragement and helpful suggestions as the study progressed.

The research was recommended for funding by the Institute for International Studies in Education and by the Office of the Dean of International Studies and Programs at Michigan State University, and financed through a project award from the Midwest Universities Consortium for International Activities (MUCIA). The field sponsorship of the project was assumed by the Associação Evangélica Teológica para Treinamento por Extensão. In addition, the cooperation of other institutions in the São Paulo area facilitated the research: the Faculdade Teológica Batista de São Paulo, the Instituto Bíblico Batista de São Paulo, the Instituto

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Metodista de São Paulo, and the Escola de Alfabetização de Santo Amaro. A sabbatical leave granted by the Conservative Baptist Foreign Mission Society freed the author to devote her time to this project.

Richard Sturz assisted the author in establishing contacts and linkages in the São Paulo area, and provided counsel on a variety of problems encountered during the field phase of the research. Eleanor D. Schlenker checked the accuracy of the nutrition information included in the programmed instruction units. Astrogilda Andrade, Paulo de Melo, Dina Rizzi and Ana Lauletto helped the author in the linguistic and cultural adaptation of programmed instruction units, questionnaires, and tests. Helena A. Rosa, Artemes M. Fernandes, Waldemur Corrêa, Hitoshi Watanabi, and Carlos Osvaldo Cardoso provided teaching and research assistance throughout the field phase of the investigation. J. N. Paternostro directed the administration, scoring, and interpretation of intelligence tests. James D. Maas provided counsel on statistical techniques, computer programming, and the interpretation of experimental findings. Ruth Sturz, Fayann Lippincott, and Paula DuChene assisted in the preparation and production of programmed instruction units, research instruments, statistical tables, and the dissertation manuscript. Staff members from the Institute for International Studies in Education at Michigan State University--Wilma Hahn, Margaret Waddell,

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Ruth Hefflebower, and Betty White--helped with administrative details connected with the research.

In addition, fourteen informants provided cultural information used in preparing instruments and instructional materials for second culture use, sixteen coordinators cared for arrangements at test sites, and 145 students, through their participation in nutrition classes, provided the data upon which the findings reported in this dissertation are based.

To all these persons and institutions the author expresses her heartfelt thanks.

Lois McKinney

May 1973

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## CHAPTER I

### INTRODUCTION

The diffusion of educational technology during the past decade has carried programmed instruction (PI) across national boundaries. "The rapidity of its spread may well have made P.I. the most swiftly disseminated innovation in the history of education" (Komoski 1965:1). Educational journals have reported the use of PI in such diverse areas of the world as Western Europe, the Soviet bloc, Israel, the Arab states, West and Central Africa, Japan, India, Brazil, and the Virgin Islands. Spaulding (1967:iv), in an introduction to UNESCO's directory of PI activities in 65 countries, calls the international expression of interest in programmed instruction "explosive." Similarly, Stolurow (1969:1020) comments that

. . . while PI began in the United States, it is probably enjoying a more flourishing development in other countries at the present time. They seem to have taken the results of early work more seriously than has the United States and have moved more rapidly toward the institutionalization of instructional technology within their educational and training establishments.

Interest in programmed instruction appears to be especially keen in development education. Educators see



in PI potential help in solving educational problems ranging from improving the quantity and quality of instruction in the face of teacher shortages to providing busy farmers non-formal instruction in basic skills (e.g., Thiagarajan 1968). Pilot studies of the feasibility of programmed instruction are being carried on in India by AID (Lange and Wedberg 1970). UNESCO has been involved in a variety of PI projects in Africa, the Middle East, Asia, and Latin America. The Commission on International Development (1969:201) has recommended " . . . greater resources for . . . research and experimentation with new techniques, including television and programmed learning."

The introduction of a teaching innovation--such as PI--into the development education arena is an international effort linking modern teachers and traditional learners. The modern educator brings his own educational experiences and expectations to bear upon developmental tasks. In the process of implementing educational programs, he introduces educational innovations from modern societies to learners in more traditional cultures. The innovations thus introduced are components of the modern instructional system in which they have evolved. As such, the innovations are usually attuned to their original milieu. They are likely to be less attuned to teachers and learners in a target culture. Adaptations of novel methods to the receiving culture will probably be necessary if effective learning is to occur.

[illegible]

### The Research Problem

To date, little has been done to determine the nature and extent of attunement necessary for effective learning to take place when a teaching method crosses cultures. The present research will explore certain dimensions of the problem of attuning teaching to culture. Programmed instruction will be both the vehicle for and the principal area of application of this research.

The research forms a link in a series of investigations being conducted by Ward and others associated with the learning effectiveness sector of the Non-Formal Education Project at Michigan State University. These inquiries into learning effectiveness seek to gather more precise information about culture-based variables in instructional systems which demand modifications of teaching procedures and transformations of instructional materials.

This series of investigations is conducted within a conceptual framework which Burger (1971) has called "ethnopedagogy." The essence of ethnopedagogical theory is that demonstrated cultural differences among learners demand attunements of teaching. These cultural attunements of teaching which are likely to contribute to effective learning must be identified, implemented, and evaluated. Ethnopedagogical investigations methodically gather data regarding learners in target cultures and the milieux in



which these learners function. From these data, incongruities between cultures and teaching are identified, and suggested modifications in instructional systems are extrapolated. Hypothetical improvements in instruction are submitted to empirical testing to determine whether or not the suggested adaptations of teaching do indeed increase the effectiveness of learning within the target culture.

The present research focuses upon two dimensions of the problem of attuning PI to learners in a specific Brazilian milieu: (1) the dimension of instructional interaction--whether or not group conditions (in contrast with individualized conditions) of instruction will facilitate learning through PI; and (2) the dimension of program style--whether or not the use of a discovery program style (in contrast with the more common expository program style) will facilitate learning through PI.

The above dimensions were chosen because (1) they focus on instructional variables which appear to be important when cultures are crossed, and (2) the literature indicates that manipulating these variables may create more favorable conditions for learning.

In discussing the first of the above dimensions (the attunement of instructional interaction to cultures) Burger (1971:98,141) sees individually prescribed instruction as possibly inappropriate in non-Anglo cultures:

We do not say that it [individually prescribed instruction] is good or bad for Yankees, but merely that it does not necessarily fit the far more sociable patterns that are normal in non-Anglo cultures. . . . It is Anglo culture that spins off the already asocial Yankee into a lonely pupil sitting at an isolated carrel and talking to the lifeless computer. I find it entirely feasible that the same cybernetic system could be designed for more communal activity.

Kress (1967:4) concludes from six North American studies of social interaction and PI that "individual pacing and privacy may not be essential for effective programmed learning . . . the results . . . lead to speculations that social interaction may actually facilitate programmed learning." Summarizing research carried on in England, Amaria (1969:103) came to a less guarded conclusion:

. . . The notion of programmed learning as an exclusively individual process may be abandoned. Cooperative work has been shown to be fully as effective as individual work and to take no longer. Whatever the additional benefits of social interaction may be, they need not be eschewed if programmed learning is adopted as a teaching method.

It may well be that the "additional benefits of social interaction" in non-Anglo cultures are even greater than those already observed in the United States and England. At any rate, an investigation of the question of facilitating PI in non-Anglo cultures through group interaction appears to be warranted.

In the area of concern defined by the second dimension of the research problem, expository versus discovery teaching, anthropologists have noted varying cultural patterns. As early as 1938, Fortes (1938:30) observed that the Tallensi rarely ask questions looking



for reasons. They demonstrate much more curiosity about methods than about underlying principles. Hall (1959:53) considers the extent to which rote learning is used as an important educational variable among cultures. Bruner (1971:19) recognizes that discovery methods of teaching take for granted "middle-class hidden curricula" through which children learn motivation toward subject matter expertise and thinking skills necessary to use the mind in intellectual ways. He admits that these assumptions about motivation and cognitive skills are questionable within certain American sub-cultures. Discovery teaching assumptions may be even more out of harmony with the "hidden curricula" of learners in cultures where expository methods are the teaching norm. An investigation of the relative effectiveness of cultural adaptations of PI in expository and discovery directions seems to be both timely and relevant.

### The Research Plan

The present research explores a series of questions arising from attempts to attune PI to a Brazilian milieu: (1) whether or not learning occurs through PI; (2) whether or not increases in the cultural attunement of PI along two dimensions (instructional interaction and program style) facilitate learning; (3) whether or not the nature of Brazilian learners affects the degree to which PI facilitates learning; and (4) whether or not certain



dominant characteristics of Brazilian learners affect the degree to which certain cultural attunements of PI facilitate learning.

Eight hypotheses are examined:

- H<sub>1</sub> Learning occurs through PI in a Brazilian milieu.
- H<sub>2</sub> PI treatment conditions differ (along dimensions of cultural attunement) in their relative effectiveness as facilitators of learning.
- H<sub>3</sub> The literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>4</sub> The modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>5</sub> Motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>6</sub> Cultural attunements of PI are relatively more productive for learners with lower literacy skills than for those with higher literacy skills.

H<sub>7</sub> Cultural attunements of PI are relatively more productive for traditional learners within a given society than for modern learners.

H<sub>8</sub> Cultural attunements of PI are relatively more productive for less motivated learners than for more motivated learners.

The design for the research calls for a four-cell participant-observer demonstration with repeated measures and four replications. It can be represented symbolically as follows:

$$\begin{array}{cccc}
 0 & X & a_1 & 0 & 0 \\
 \hline
 0 & X & a_2 & 0 & 0 \\
 \hline
 0 & X & b_1 & 0 & 0 \\
 \hline
 0 & X & b_2 & 0 & 0
 \end{array}$$

where 0 represents pretesting, posttesting, and delayed posttesting, X represents treatments, a and b represent treatment conditions along a program style dimension, and 1 and 2 represent treatment conditions along an instructional interaction dimension. The symbols a<sub>1</sub>, a<sub>2</sub>, b<sub>1</sub>, and b<sub>2</sub> indicate combinations of conditions to be employed in treatments in a 2 x 2 factorial design. Dotted lines separating treatments indicate that intact groups are involved. Treatments will be replicated four times, so that a total of sixteen intact groups will be included in the study.





The subjects in the present research are 145 youths and adults (ages 14-75) who reside in the metropolitan area of São Paulo, Brazil. They are voluntary participants in a three-session programmed course on nutrition given at sixteen testing sites throughout Greater São Paulo. The mean years of formal schooling for these subjects is 3.7. Eighty-three percent of them are employed in manual occupations with low social status.

Two versions of a programmed nutrition unit have been developed for this research. The versions are varied systematically along three dimensions of expository-discovery teaching described by Shulman (1970): (1) the degree of guidance provided, (2) the ruleg or egrule sequencing of instruction, and (3) the didactic or Socratic style of instruction.

In addition, instruments have been adopted, adapted, and developed to provide measures of learner characteristics (literacy skills, modernity, and motivation to learn) and to provide measures of learning (acquisition of content, transfer of training, retention of learning, strategies employed in learning, and affective responses toward instruction).

Data are gathered through three visits to each of sixteen test sites. Analysis procedures call for analyses of variance and simple and partial correlations.

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### Applications of Research Findings

This research asks and answers practical questions: Does PI teach in Brazil? Do cultural attunements of PI facilitate learning? What learner characteristics seem most related to effective learning through PI?

Information gleaned through these questions will be valuable to development educators who teach in milieux similar to that described in this study. Adaptations of PI in the direction of cultural attunements should improve the teaching effectiveness of PI in development efforts such as extension education and literacy education. The study also has cost-benefit implications; negative findings would indicate that current efforts to attune instruction to cultures may not be worth the time and money.

Another value of this research lies in its application to American sub-cultures. A macroscopic study across cultures may enlarge to observable dimensions some of the specific constants and variables in instruction which are difficult to see in their microscopic dimensions within sub-cultures.

The study will hopefully make a contribution to teaching theory (1) as a cross-cultural validation of earlier findings in PI research, and (2) as a pilot contribution to ethnopedagogical research on PI.

End-products of the research which are potentially useful in future inquiries include (1) several data-gathering instruments which have been adopted, adapted, or developed through field work; (2) a programmed nutrition unit which has been systematically varied along expository and discovery dimensions of teaching; and (3) extensive data which lend themselves to analyses beyond those projected for the present research.<sup>1</sup>

### Definitions of Terms

Terminology which is used in specialized ways in this dissertation is defined below.

#### Terminology Related to Culture

Ethnopedagogy is the study of teaching in relation to cultural expectations and needs; it is concerned with the cross-cultural application of principles of teaching. Receiving culture, second culture, and target culture are synonymous terms. They are used in a general sense to refer to any culture in which instructional procedures or materials from another culture are introduced. These terms are also used in a particular sense to refer to the region of Brazil in which the research field work is conducted. Cultural attunement of instruction is the adaptation of

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<sup>1</sup>These data will be made available to subsequent researchers through the Institute for International Studies in Education at Michigan State University.

teaching and/or instructional materials to characteristics of learners within a given culture.

### Terminology Related to Teaching

An instructional system is a network of inter-related socio-cultural, psychological, value, and communication factors which interact in the teaching and learning process; the principle components of an instructional system are learners, teachers, subject matter, media, and the milieu. Instructional interaction refers to the dynamic relationships and actions which are observed among the components of an instructional system. Bilateral or individualized interaction is a condition in which the primary learning occurs as the result of an individual student's interaction with an instructional program. Multilateral or group interaction is a teaching condition in which the primary learning occurs in a milieu which includes, in addition to the interaction of the student with the program, significant interaction among peers. Programmed instruction (PI) broadly defined, is a complex instructional sub-system involving interaction among learners, live teachers, the subject matter, the programmed materials, the presentation devices, and the cultural milieu. Narrowly defined, it is a method of teaching in which information or tasks are presented in sequential steps requiring active response by the student, and for which the student is given immediate feedback adequate for

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him to evaluate his own responses. A program or in-  
structional program is a unit of study in which PI methods  
 have been employed. Ruleg instruction proceeds deductively  
 from rules to examples. Egrule instruction is inductive;  
 the student is given examples and encouraged to find the  
 rules himself. Didactic instruction is teaching in which  
 the student makes smooth progress toward predetermined  
 objectives through small, carefully sequenced instructional  
 steps. Socratic instruction creates successive states of  
 equilibrium and disequilibrium as problems are raised,  
 tensions created, solutions formed, out of which new  
 problems are raised. Expository teaching is guided,  
 deductive, and didactic. Discovery teaching is less  
 guided, inductive, and Socratic.

#### Terminology Related to Research Personnel

Teacher-assistants (or teachers) are Brazilian  
 personnel who share data gathering responsibilities at test  
 sites with the investigator. Coordinators are leaders in  
 local community settings who are responsible for matricu-  
 lating students and caring for physical arrangements at  
 test sites. Students are the research subjects of this  
 study. They are voluntary participants in a three-session  
 course on nutrition. Informants are representative members  
 of the target culture who provide one of the sources of  
 cultural data used in adapting instruments and programs to  
 the thinking processes of the learners.

### Overview of the Dissertation

In this chapter, a research problem has been identified, and a plan for inquiry into the problem has been introduced. In the remaining chapters, the development and execution of the research are reported. Literature which is the most closely related to the present investigation is discussed in Chapter II. The research plan is outlined in Chapter III. Analyses of data and summaries of findings are reported in Chapter IV. In the final chapter, findings are discussed, a summary of the investigation is provided, conclusions are drawn, and implications for teaching and further research are suggested.



## CHAPTER II

### RELEVANT LITERATURE

A search for literature related to the cross-cultural adaptation of programmed instruction (PI) along expository-discovery and individualized-group dimensions converges upon three concentrations of research concern: (1) cross-cultural teaching, (2) expository and discovery teaching through PI, and (3) instructional interaction in PI.

#### Literature Related to Cross-Cultural Teaching

Literature on cross-cultural teaching is diffused throughout the behavioral sciences. Implied or explicit principles for adapting teaching to cultures are scattered across disciplines such as educational anthropology, educational sociology, educational psychology, social psychology, cross-cultural communication, and comparative education. To date, this diverse literature on cross-cultural teaching has not been collated into a meaningful whole, nor have specific suggestions for teaching across cultures been synthesized into principles which would

apply to a wide range of cross-cultural teaching situations. Important efforts in the direction of such syntheses and generalizations have been made by Burger (1971) and Taba and Elkins (1966). Their conceptual contributions to the present research are described below.

Burger's Contribution:  
Ethnopedagogy

Burger's contributions to the present research include (1) the concept of ethnopedagogy, and (2) a method for adapting teaching to culture. "Ethno-pedagogy," as Burger (1971:12) defines it, is "the activity of cross-cultural teaching," or, more specifically, "teaching techniques when applied across cultures, as from dominant cultures, such as the Anglo, toward a minority culture, such as Hispanics in the United States."

Burger has developed a three-step methodology for adapting teaching to culture: (1) identifying ethnic variables, (2) recognizing specific problems which are likely to occur in cross-cultural encounter because of cultural differences, and (3) adapting components of instruction cross-culturally to bring conflicting ethnic patterns into harmony.

The first step in Burger's method is accomplished through a careful examination of anthropological literature as a means of identifying ethnic variables. As examples of cross-cultural variables identified in ethnological literature, Burger cites Promethianism (environmental control),



timing, spacing, sociality (social organization, family and kinship structures), transitivity (communication), and ethics.<sup>1</sup>

Through a second step in adapting teaching to culture, ethnic variables are analyzed to reveal problems which are likely to occur when two cultures meet. Burger gives examples of problems growing out of cultural differences between teachers and students, between schools and communities, between interacting ethnic groups, and between individuals within a culture. He also mentions cultural differences in individual cognitive development, age roles, sex roles, and institutional roles.

The final step in Burger's method for adapting teaching to culture is a three stage operation which includes (1) deciding what cultural attunements of pedagogy are needed, (2) implementing these adaptations in laboratory classrooms, and (3) sharing observations and insights with educators in the field.

Two examples of the many suggestions and guidelines Burger (1968:111,113) has provided will make his approach clear:

Example 1. Because of strong kinship bonds among Hispanic children, Burger suggests that the

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<sup>1</sup>Burger has adapted this list of variables from Kluckhohn and Strodtbeck's (1961) cross-cultural study of value orientations.

Anglo teacher allow them to determine their own seating arrangement in classes and not expect them to develop age-grade friendships to the same extent that their Anglo counterparts do.

**Example 2.** Since the dichotomy of fact and feeling is not appropriate in Hispanic culture, he suggests that Anglo instructors combine cognitive and affective materials in their teaching. He cites an example in which Mexican-American students improved their English by writing poetry.

Burger's work is exploratory and limited in its scope. A comprehensive taxonomy of ethnopedagogical variables, as well as instruments for controlled measurements of variables, are lacking. The data are based largely on within culture observations. Empirical and comparative studies of cross-cultural teaching are needed. However, even in its infant stage, and in spite of its delimited framework, Burger's approach provides a useful model for cross-cultural research on teaching.

#### Taba and Elkins' Contribution: Teaching Strategies

Taba and Elkins (1966) describe teaching strategies designed to reach students who are culturally different from their teachers. Such strategies grow out of a

continual diagnosis of the teaching-learning process. They are designed to teach cognitive processes (such as how to abstract and how to categorize) and durable concepts and ideas (rather than a multiplicity of facts and information). Diversity among learners is provided for through open-ended tasks which encourage contributions of differing depth and content. Motivational devices emphasize tangible, overt, and immediate rewards.

Taba and Elkins suggest specific methods useful to cross-cultural teachers, such as play-making, role playing, interviewing, open-ended discussions, and the use of literature. They believe that methods such as these are especially appropriate for students with deficits in skills such as reading, observation, and empathy.

Taba and Elkins bring a theory of curriculum development to bear upon problems encountered in a cross-cultural classroom. Their contributions, and those of Burger (1971), discussed above, are complementary: Burger applies ethnology to teaching; Taba and Elkins apply teaching to culture. Together, their insights provide a conceptual framework for the attempt made in the present research to relate knowledge from ethnology and pedagogy to problems in adapting programmed instruction across cultures.

### Literature Related to Expository and Discovery Teaching

The choice of literature to be reviewed in this section reflects beliefs that research examining expository-discovery teaching variables should (1) build upon a knowledge of current issues in teaching and learning theory (Shulman 1970), (2) demonstrate an awareness of previous experimental studies in the field (Wittrock 1966; Tanner 1969b; Hermann 1969), (3) consider methodological suggestions by earlier reviewers and researchers (Cronbach 1966), and (4) build upon specific methodological models which are likely to be productive (Worthen 1968; Gagné and Brown 1961).

### Theoretical Framework

Shulman (1970) identifies four key theoretical issues which distinguish educators who advocate discovery teaching (Bruner 1961) from those who are proponents of expository teaching (Gagné 1965; Ausubel 1968): (1) the nature of instructional objectives, (2) the nature of readiness for instruction, (3) the nature of effective teaching, and (4) the direction and scope of transfer of training.

Instructional objectives, for advocates of discovery teaching, emphasize thinking skills, cognitive strategies, learning styles, and other processes. In contrast, objectives of instruction formulated by

proponents of expository teaching stress either operationalized terminal behaviors (Gagné) or mastery of subject matter (Ausubel).

Readiness for instruction, for Bruner, is a stage of development both within the learner and within the subject matter. Readiness occurs when the development of the learner (in terms of Piagetian stages) and the development of the subject matter (in terms of enactive-ikonic-symbolic stages) correspond. Thus Bruner (1960:33) states that "any subject can be taught in some intellectually honest form to any child at any stage of development." Neither Gagné nor Ausubel explain readiness in such ontogenetic terms. For them, readiness is the presence of skills or knowledge which are prerequisite to the skills or subject matter to be learned.

Contrasting teaching methods flow logically from discovery and expository theories. Shulman (1970:53) compares discovery teaching to "a roller-coaster ride of successive disequilibria and equilibria terminating in the attainment or discovery of a desired cognitive state." Conversely, expository teaching is described as "a smoothly guided tour up a carefully constructed hierarchy of learning tasks" (Shulman 1970:53). In terms of specific attributes, expository teaching is described as guided, ruleg, and didactic, whereas discovery teaching is characterized as less guided, egrule, and Socratic.



Finally, Shulman compares conceptions of transfer of training in expository and discovery teaching. For Gagné, transfer is primarily vertical, in an ascending hierarchy. Elements which are transferred are specifically similar to those acquired through prior experience. For Ausubel, transfer of training involves a progressive differentiation of subject matter. For Bruner (1957), transfer of training is "to go beyond the information given" in a broad, lateral application of fundamental principles and strategies.

#### Reviews of Literature

Wittrock (1966), Tanner (1969b), and Hermann (1969) have reviewed research on expository-discovery variables. Wittrock (1966) evaluates research in which discovery has been treated as (1) an intervening variable, (2) an independent variable, and (3) a dependent variable. He finds the concept of discovery of little use to researchers who are studying intervening variables (processes within the learner, such as un verbalized awareness, motivation, or verbal mediation). He believes that behavioristic approaches to this kind of research are more effective. When discovery is treated as an independent variable, Wittrock considers the research to be somewhat better controlled, and the possibilities for future investigations to be more promising; at the present state of knowledge, any conclusions that can be made about discovery as an

independent variable are highly tenuous. Wittrock notes that little research has been done in which dependent variables--multidimensional measures of learning outcomes, such as transfer, motivation, and problem solving--have been clearly identified, analyzed, and held constant from one study to another. He considers such research to be sorely needed.

Tanner (1969b) provides a description of twenty studies in which teaching has been varied along expository-discovery dimensions. He summarizes the results of expository-discovery research as being equivocal or inconclusive. He suggests several factors which may have contributed to equivocal findings: (1) poor research design, (2) lack of agreement on the conceptualization of discovery and expository variables, and (3) poor control over crucial design factors, such as the activity or passivity of students and the duration of treatments. He proposes (1) that future studies attempt a broader, more spontaneous, and natural conceptualization of discovery; (2) that future studies focus more attention on differences among learners in relation to the effectiveness of discovery approaches; and (3) that such studies be conducted for longer durations of time to avoid the problems of unfamiliarity and novelty of discovery methods which often contaminate short-term experiments.

Hermann (1969) attempts a critical analysis of eighteen recent discovery-expository experiments. The studies are shown to have produced inconclusive, conflicting and often insignificant findings. Hermann suggests that the uninterpretable results of expository research are due to (1) poorly defined experimental variables, (2) weak experimental designs and analyses, and (3) interaction among treatments and other factors such as age, intelligence, prior knowledge of subject matter, difficulty of learning tasks, categories of learning (concepts, principles, problem solving), subject matter taught, organization of subject matter, amount and kind of verbalization of principles required, amount and type of guidance, duration of instruction, and activity or passivity of students during instruction.

#### Methodological Suggestions

Predictably, inconclusive findings have served as a catalyst for suggested improvements in discovery-expository research methodology. Cronbach (1966) has offered a series of methodological suggestions. He urges those who inquire into discovery problems to employ (1) tasks which are a part of a system of subject matter, (2) teaching which gives each method an equal opportunity to demonstrate its effectiveness, (3) time spans long enough to overcome novelty and/or nonfamiliarity effects, (4) multidimensional measures of learning outcomes, and (5)

analyses which account for individual differences in response to teaching methods.

### Methodological Models

Worthen (1968) is cited by Shulman (1970) as a model for the kind of research which Cronbach proposes. In the Worthen study, 538 fifth and sixth graders received mathematics instruction over a six-week period under normal classroom conditions. Teachers were trained over a twenty-week period (1) in the use of text-like instructional programs which varied in rule-governed sequence characteristics, and (2) in demonstrating teaching behaviors associated with discovery and expository methods.<sup>2</sup> Each teacher taught classes under each of the two conditions. The design included controls of the total teaching time, the amount of time spent in verbalizing generalizations, and the degree of teacher compliance with the prescribed methods. Measures were provided for initial learning, retention, attitude, transfer of concepts, and transfer of heuristics. Significant findings favored the discovery method on measures of retention, measures of transfer of concepts, and measures of transfer of heuristics. Subjects taught by the expository method showed higher initial

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<sup>2</sup>For example, in the expository method the teacher acts as if he is the source of knowledge, and in the discovery method he acts as if he expects the student to help him solve problems.

learning scores. There was no significant difference on attitude measures.

In spite of its many exemplary qualities, certain weaknesses are apparent in the Worthen study. One such weakness, teacher variability, was confirmed through statistical analyses of interaction effects. Another major weakness was variability in the rate of instruction; groups spent unequal amounts of time on individual units of instruction.

As a means of controlling teaching and content variability in research on expository-discovery variables, several investigators have employed programmed instruction as a teaching medium.<sup>3</sup> Gagné and Brown (1961) used PI as a vehicle for research on the relative effectiveness of expository and discovery teaching in developing problem solving ability. The subjects were thirty-three ninth and tenth grade boys. Three programs were developed to teach students to state and use formulas for the sums of numbers in a series. The programs were systematically varied along ruleg, step-size, and guidance dimensions. One program (Gagné and Brown called it a "rule and example" program, though ruleg sequencing was enriched by small step-size and emphasis on guidance-type instruction) stated the formula and gave examples of the use of the formula. A "discovery"

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<sup>3</sup>Investigations which have used PI in research on expository-discovery teaching include Gagné and Brown (1961), Wolfe (1963), Krumboltz and Yabroff (1965), Tanner (1969a), Koran (1971), and Hermann (1971).

program showed examples of uses of the formula, and then asked the student to tell the instructor what the rule was, or to look on the next card if he needed another hint. The third program, called "guided discovery," led the student through a series of examples to the guided discovery of principles. When problem solving performance based on conceptual learning was measured, the "guided discovery" program was found to be most effective, the "rule and example" program least effective, and the "discovery" program in between. The differences were significant at the .05 level.

The Gagné and Brown (1961) research is distinguished from other research on discovery using PI as a medium in at least one important respect: expository and discovery teaching are defined in broader terms. Programmed instruction studies of discovery have generally varied instruction only along a ruleg-egrule dimension; Gagné and Brown varied ruleg-egrule sequencing, step size, and the amount of guidance given. The net effect is a program which reflects an adequate conceptualization of "discovery" and "expository" teaching, and allows the multiple factors inherent in such teaching to interact in natural ways. Gagné and Brown's definition of discovery along multiple dimensions rather than a single dimension might well explain why this research is the only research on discovery using PI as the medium which has resulted in significant differences on criterion measures.

The design of the present research--along its discovery-expository dimension--is a mélange of the Worthen (1968) and Gagné and Brown (1961) models. Like the Worthen study, the present research (1) takes place in a natural teaching environment, (2) employs school subject matter as the content, (3) carefully trains teacher-assistants, and (4) provides for multiple measures of learning. Like the Gagné and Brown study, the present research (1) uses PI as the medium of instruction; (2) defines programmed discovery and exposition in multidimensional terms; and (3) employs a mastery model in which problem solving is based on pre-requisite concepts, and in which time (rather than content) is varied.

#### Literature Related to Instructional Interaction

When programmed instruction (PI) began to make an impact on the educational world more than a decade ago, self-pacing and individualization were considered to be essential and advantageous components of the method. Skinner (1961:387, 388), for example, believed that

Holding students together for instructional purposes in a class is probably the greatest source of inefficiency in education. . . . In trying to teach more than one student at once we harm both fast and slow learners . . . machine teaching is unusually efficient because (the student) is free to move at his natural rate.

Interestingly (and somewhat surprisingly to proponents of self-paced PI) empirical investigations failed to support Skinner's claims. One of the earliest and

clearest generalizations to grow out of research on PI was that " . . . the experimental literature has not been able to demonstrate as much advantage for individual pacing as might be expected" (Schramm 1964:11).

These negative findings were augmented (1) by reports that some students found PI to be boring (e.g., Gagné and Dick 1962), and (2) by a growing body of empirical evidence that work in small groups offers certain benefits not available to individuals working alone.<sup>4</sup>

### Reviews of Literature

The possibility of wedding the benefits of PI to the benefits of social interaction has generated research interest in both the United States and England. Literature on social factors in PI has been reviewed by Kress (1967) and Hartley (1968). Kress (1967) concludes from six investigations in which programmed instruction has been administered to interacting groups (1) that individual pacing and privacy may not be essential to PI; (2) that social interaction may facilitate learning through PI;

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<sup>4</sup>Research findings summarized by Hare (1962:363) and by Argyle (1969:253-260) show problem-solving groups to be more effective than individuals (1) in reaching accurate solutions to problems, (2) in producing new ideas, (3) in heightening motivation, (4) in encouraging risk taking, and (5) in enhancing recall of information. Negatively, group activity (1) takes longer, (2) is not equally effective with all individuals, and (3) is often hindered by inhibiting factors such as status hierarchies or pressures toward conformity.



and (3) that group pacing and group interaction may provide an answer to complaints that individualized PI is boring, difficult to administer, and encourages poor work habits (such as copying answers and hurrying).

A comprehensive review of the literature on social factors in PI has been provided by Hartley (1968). Although his focus is primarily upon research in Great Britain, most of the relevant American studies (e.g., Dick 1963a, 1963b; Crist 1967; Frye 1963) are also included in his report. Three groups of studies are analyzed: (1) studies which compare the effectiveness of PI of individuals and of interacting pairs, (2) studies which compare individually-paced and group-paced PI, and (3) studies which compare externally-paced and self-paced PI.

The first group of studies in Hartley's (1968) review (those comparing PI for individuals and interacting pairs) are especially relevant to the present research because (1) the individualized-paired interaction variable in the above studies is similar to the instructional interaction variable included in the present study; and (2) the findings of this precedent research reported by Hartley provide conclusive evidence that the paired use of PI does not hinder learning, and may even help students to learn.

Consistently with the above findings, current investigations in England (e.g., Amaria et al. 1969;

Hartley and Hogarth 1971) assume the effectiveness of using PI in pairs, and are exploring means of augmenting the efficacy of the method through variations such as pairing by homogeneous or heterogeneous ability.

### Contributions to the Present Research

Dick (1963a,1963b), Hartley (1968), Burger (1971), Cocoran (1970), and Parry (1965) have made specific contributions to the instructional interaction dimension of the present research. Dick has provided a methodological model for studies of interaction in PI. Hartley has created an awareness of the present state of research on social factors in PI, and of directions future research might take. Burger, Corcoran, and Parry have added a cross-cultural perspective to the study of instructional interaction in PI. This literature is discussed below.

The contribution of Dick.--Dick (1963a,1963b) has investigated the relative effectiveness of individualized and paired conditions of PI in terms of initial learning (1963a) and long-term retention (1963b). The subjects were seventy university students randomly assigned to individual or paired conditions for a twenty-eight unit (3,500 frame) programmed course in algebra. A comparison of the individual or paired conditions on initial learning measures revealed no significant difference between the two treatments. On a retest administered one-year later to

80 percent of the subjects, the students who had studied in pairs achieved retention scores significantly higher than those of students who had worked alone.

Dick's study has been criticized by others (e.g., Hartley and Cook 1967) on several grounds: (1) the research employs a questionably low ( $p = .07$ ) level of significance, (2) the paired students spent significantly longer on the lessons than students who worked alone, and (3) 20 percent of the subjects were lost between the initial test and the retention test. Even those who are critical of Dick's investigation, however, are quick to acknowledge its influence on their own research efforts. Hartley and Cook (1967:168), for example, recognize Dick's study as a prototype which has "a wide influence on English thought."

Dick's research has contributed to the present investigation in two important ways: (1) the present research has adopted his peer interaction procedures in which the subjects (a) respond to programmed items independently, and (b) check and discuss their work on each frame with peers before proceeding with the lesson; and (2) this study has also followed Dick's example in including a retention test as a measure of learning.

The contribution of Hartley.--Hartley's (1968) review of literature on social factors in PI has been discussed earlier in this chapter. The investigations he

reports were conducted with a variety of students studying different subject matter in varied settings. With no exceptions, the studies found peer interaction in PI to be either (1) as effective as, or (2) more effective than individualized PI. These relatively conclusive findings have contributed to the decision to extend the present research on instructional interaction in PI into a natural setting in which certain features of interaction, such as group size and group composition, will be allowed to fluctuate normally. Earlier research has controlled the size of interacting groups; the present research allows from two to five peers to work together in the group condition. Earlier research assigns subjects to pairs either randomly or by characteristics such as ability; the present research encourages natural groupings determined by (1) physical facilities,<sup>5</sup> (2) order of arrival at treatment sessions, and (3) friendship preferences. The present state of the art, as Hartley reports it, seems to warrant extending research on social factors in PI to the conditions and settings proposed in the present research. Hopefully, the degree of risk-taking involved in conducting research under natural rather than laboratory conditions will be justified through positive findings

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<sup>5</sup>The size of the groups varies with (a) the size, number, and shape of tables available; (b) the size, number, and shape of rooms available; and (c) the surrounding noise level.

generalizable to more situations than similar findings growing out of controlled experiments.

Cross-cultural contributions.--Burger (1971), Corcoran (1970), and Parry (1965) have added a cross-cultural perspective to the study of social factors in PI.

Burger's (1971) conceptual contributions to this research have been discussed earlier in this chapter. One of the specific pedagogical proposals which he offers is that PI for Latins and Indians be used communally rather than individually. Burger's intriguing suggestion that the cultural attunement of PI along an individual-group dimension may facilitate learning has influenced the decision to select instructional interaction as one of the variables to be examined in the present research.

The probable value of attuning PI along an individualized-group dimension has been corroborated by Corcoran's (1970) observations of the use of PI in an elementary school on the Rocky Bay (Montana) Indian Reservation. Corcoran describes experiences in implementing individualized programmed instruction in this setting. He considers Indians to be less communally oriented than Burger does, and finds individualized PI to be effective. In the midst of his strong defense of individualized instruction, however, he makes two observations which would argue for the use of PI in group settings. First, Corcoran notes that spontaneous

"peer-tutor" relationships develop among students when individualized PI is used. Secondly, Corcoran observes that the use of individualized PI augments rather than diminishes the need for supplementary teacher-controlled group interaction.

The questions which Burger and Corcoran have raised concerning the possible merits of attuning interaction in PI cross-culturally can be answered only through experimentation. To date, only one empirical investigation (Parry 1965) has been reported in which instructional interaction in PI has been studied in a non-Western setting. Parry's research was conducted in Nigeria. He developed a flip-chart presentation of a geometry lesson in which PI was group paced. All students finished a frame before feedback was given. A control group completed the same programmed lesson as individualized instruction in book form. The experiment was repeated in four regions of Nigeria. Results on learning measures clearly favored the flip-chart groups.

Parry's investigation is reported informally. Many of the pertinent details--such as the number of students involved, the number of schools and classrooms included, and the results of statistical analyses of data--are not reported. In spite of inadequate reporting, however, the study offers some tentative empirical evidence that the group use of PI may facilitate learning in a non-Western

setting. Hopefully, the present research will provide a useful augmentation of Parry's earlier findings.

### Summary

Literature which has made specific contributions to the present research focuses upon (1) cross-cultural teaching, (2) expository and discovery teaching through PI, and (3) instructional interaction in PI.

The diverse literature on cross-cultural teaching has not been collated into a meaningful whole. Many reports of studies and development projects relating to ethnic and cultural problems of teaching are available; these tend to be case-specific, problem-centered and largely disarticulate with any larger body of theory. Important efforts in the direction of syntheses and generalizations have been made by Burger (1971) and Taba and Elkins (1966). Burger applies ethnology to teaching; Taba and Elkins apply teaching to culture. Together, their efforts provide a rudimentary conceptual framework for the present research.

Literature related to expository and discovery teaching contributes to the present research by (1) identifying key theoretical issues in the expository-discovery teaching debate (Shulman, 1970), (2) reviewing research on discovery and expository learning (Wittrock 1966; Tanner 1969b; Hermann 1969), (3) offering methodological suggestions for this kind of research (Cronbach

1966), and (4) providing specific methodological models for the design of the present research (Worthen, 1968; Gagné and Brown 1961).

Contributions are also made to the present research by literature on instructional interaction in PI. Reviews of this literature have been provided by Kress (1967) and Hartley (1968). Dick (1963a,1963b) offers a methodological model for the study of interaction in PI. Burger (1971), Corcoran (1970), and Parry (1965) add a cross-cultural perspective to the problems involved in adapting PI along the individualized-group dimension.



## CHAPTER III

### THE RESEARCH PLAN

Several assumptions about programmed instruction (PI) and biases about research on teaching are reflected in the present research. These assumptions and biases, and the research plan which has evolved from them, are described below.

#### Assumptions Regarding Programmed Instruction

Several assumptions regarding programmed instruction (PI) are basic to this research: (1) PI, as one of the more rigorously defined and empirically examined instructional methods, is a vehicle for research with broad implications for teaching and learning; (2) characteristics of PI, such as its auto-instruction and its use of step-by-step presentation of content to be mastered, make the method one of the more promising of the proposed solutions to certain educational problems in developing countries; (3) PI, as empirically defined and tested with Western academic models reflects learning styles observed or fantasized by technologically advanced, modern societies;

and (4) though developed within the behaviorist research tradition, PI is compatible with other theories of learning such as cybernetics or cognitive development.<sup>1</sup>

### Research Biases

The present study reflects certain biases about research on teaching. One bias is that such research should be conducted in the field rather than in a controlled experimental environment. A field-based demonstration is more vulnerable to rival hypotheses than a similar study conducted under more controlled conditions. But a reality setting, allowing as it does for both observations of unexpected effects and immediate and direct applications of research findings, provides a better laboratory for research on teaching than does a laboratory.

A second bias is that research on teaching should seek a conciliation between holistic and particularistic

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<sup>1</sup>The key theoretical issue here is the degree and kind of learning activity involved in the learning process. To the behaviorist, PI shapes the learners' behavior in terms of predetermined objectives as responses to the environmental stimuli (the program) are reinforced through feedback (e.g., Skinner 1961). To the cybernetician, PI enables self-monitoring activity as the learner selects and plans the next steps in his learning on the basis of programmed feedback from his previous responses (e.g., Smith and Smith 1966). To the cognitive theorist, the learner accommodates environmental information from PI into existing cognitive structures (e.g., Ausubel 1968). In this study any one of these theoretical positions is assumed to be a reasonable explanation of learning through PI.

inquiry. Precise data should be searched for through a focus on specific problems, and interpretable data should be sought by maintaining a global perspective (Shulman and Keislar 1966:195-198).

A further bias of the present research is that an investigator of teaching processes can be efficient as an experimenter in a participant-observer role. As an experimenter, he manipulates independent variables and introduces careful treatments into the milieu. Through quasi-experimental techniques more data (and better controls) result than would come from a purely observational study. As a participant-observer, the investigator conducts his research from within the system under study so that some of his data come from his own interactions with persons under conditions which he has created. Thus the investigator leaves room for subjective observation and reporting that often determines the generalizability of the research. The investigator's own sensitivities and experiences contribute to the clarity of the findings and the validity of the conclusions of the research.<sup>2</sup>

Another bias of this study is that research on teaching should be conducted within an intermediate time frame, long enough to gather several samples of students' behaviors under varying circumstances, and yet short

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<sup>2</sup>Bruyn (1966) describes research through participant-observation. The above comments reflect his viewpoint.

enough to conform to realistic time and cost limitations. Research on teaching should provide for repeated and multiple measures wherever possible, so that strategies, affective responses, and longer term effects of teaching can be considered along side the more usual measures of immediate learnings and content acquisition.

A final bias of the research is that when variations among learners and settings are largely uncontrolled, treatments should be replicated in a variety of settings. Such replications are needed both to disconfirm rival hypotheses growing out of individual and group differences and to enhance the external validity of the study.

### Subjects

The subjects in the present study are youths and adults who reside in the metropolitan area of São Paulo, Brazil. They are voluntary participants in a three-session course on nutrition given at sixteen testing sites throughout Greater São Paulo.

A total of 191 students matriculated in the course. Forty-two of these cases are not reported here because they lack one or more essential parts of the treatment<sup>3</sup> (through absenteeism, failure to complete or turn in home assignments,

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<sup>3</sup>The essential aspects of the treatment include two criterion measures (Exercises 1 and 2), a pretest, an immediate posttest, a delayed posttest, and four lessons (a nutrition unit) completed through programmed instruction.

late arrival at a session, or inability to keep pace with the group). Four more cases have been dropped because late arrival at the first session precluded random assignment of these individuals to a treatment group. Thus a total of 145 complete cases are reported here.

Table 1 provides a description of the subjects included in this study. Their ages range from 14 to 75 years. Seventy percent are women. Only 15 percent have studied beyond primary school. At least half report very traditional school experiences (such as standing for recitations). Eighty-three percent are employed in manual occupations or are from homes where the chief breadwinner is employed in a manual occupation. Three-fourths of the subjects resided in urban centers of 10,000 or more when they were ten years old. Fifty-five percent lived in states other than São Paulo. Forty-two percent of the subjects have migrated to São Paulo within the last nine years. Seventy-two percent attend church at least once a week.

### Test Sites

This research was conducted with intact groups at sixteen test sites.

### Location of Sites

All of the test sites are located within Greater São Paulo. Eight are in the south zone of the city, four

Table 1.--Description of Subjects (Based on 145 Complete Cases).

SEX	Men	29.7%	RESIDENCE WHEN 10 YEARS OLD	Rural	23.4%
	Women	70.3%		Urban	76.6%
AGE	Minimum	14 Yrs.		São Paulo State	45.5%
	Maximum	75 Yrs.		Other States	54.5%
	Mean	31.7 Yrs.			
YEARS OF SCHOOL	More than 4 Years	14.5%	STABILITY OF RESIDENCE IN SÃO PAULO	9 Years or More	57.6%
	Four Years	44.1%		Less Than 9 Years	42.4%
	Less Than 4 Years	41.4%			
KIND OF SCHOOLING	Traditional	51.0%	COMMUNITY PARTICIPATION (Church Attendance)	More Than Once a Week	45.1%
	Transitional	12.8%		Once a Week	27.1%
	Modern	36.2%		Less Than Once a Week	27.8%
	Non-Manual	16.6%			
OCCUPATION	Manual	83.4%			

are in the west, three are in the north, and one is in the east. Twelve of the groups are church-related, and four are in a state-sponsored literacy school. Of the church-related groups, half are intact, on-going women's organizations which are accustomed to meeting regularly, and half are ad hoc groups created with volunteers enlisted through publicity in the local community.<sup>4</sup>

### Selection of Sites

The selection of test sites attempts to avoid both choosing groups on the basis of maximum convenience, and choosing groups where linkages are so poor that a disproportionate amount of time, expense, and researcher fatigue would be involved in achieving the high level of cooperation necessary for successful data gathering.

An attempt is made, within the context of existing linkages, to select groups which are as diverse as possible from each other in terms of geographical area of the city, SES, religious affiliation, and motives for participation in the course. The selection of test sites is also influenced by practical considerations such as the interest of local leaders, the availability of subjects and coordinators at the locale under consideration, the possibility of coordinating the schedules of teacher-assistants

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<sup>4</sup>Appendix A provides additional information on test sites including dates course was held, location of site, kind of group involved, treatment given, and teacher-assistants participating.

with the time preferences of the local groups, reasonable travel time to the sites, and safety of travel for women investigators and teacher-assistants.

### Arrangements at Sites

This phase of the project depends heavily upon good human relations and the credibility of the investigator with persons contacted at the test sites. Key persons at each site need to become sufficiently convinced of the value of the project to become active recruiters of students for the cursinho.<sup>5</sup> These persons must then be prepared to serve as coordinators of local arrangements. Often the investigator or one of the teachers is asked to attend community meetings to present and publicize plans for the cursinho. Follow-up contacts are usually necessary to verify that arrangements have been made. An average of five contacts by the investigator or by a teacher-assistant is necessary at each of the sixteen sites to complete these initial arrangements.<sup>6</sup>

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<sup>5</sup>Cursinho is a diminutive Portuguese form meaning "little course," and connoting both warm acceptance and short duration.

<sup>6</sup>Appendix B includes several publicity and information pieces which are used in arranging test sites: an article explaining the purposes and scope of the study to local leaders ("Respondendo Às Suas Perguntas Sobre O Estudo Pedagógico Inter-Cultural"), a description of coordinators' responsibilities, and a letter and instruction sheet for local teachers at a literacy school.



### Research Personnel

The complexity of the present study requires the participation of personnel in addition to the principal investigator. Two categories of personnel, teacher-assistants and coordinators, are described below.

#### Teacher-Assistants

The obtrusive effect of a foreign investigator's presence at test sites is lessened when the leadership is shared by the investigator and national teachers. Findings are enriched by the contributions, insights, and awareness of cultural nuances of these competent national persons. Their enlightenment of the investigator throughout the planning, execution and evaluation stages of the research is a significant part of the investigative process.

Selection.--The three teacher-assistants participating in this research are students at the Faculdade Teológica Batista de São Paulo. They have been recommended by faculty members at this institution as being persons qualified for a research-assistant role. Each is in the fourth year of university-level work. Two are men and one is a woman. Two are education majors; the third is a theology major who has had three courses in education. Two have had course work in the scientific method and probability theory. All are experienced teachers of adults in non-formal settings.

Remuneration.--These teacher-assistants receive both financial remuneration and course credit in return for their participation in classroom training sessions and data gathering activities at test sites.

Training.--Teacher assistants are trained through weekly three-hour training sessions, beginning five weeks before the first data is gathered, and continuing to the end of field work. Activities during these sessions include: (1) discussion of relevant research, educational, and sociological theory; (2) a detailed study of the design of the research in which they are participating (including the research problem, hypotheses, assumptions, variables, instruments, procedures, and analyses of data); (3) practice in interviewing, administering tests, and other data gathering procedures; (4) coordination of schedules and arrangements being made at test sites; (5) evaluation of field work at test sites; (6) discussion of preliminary findings and their implications; and (7) discussion of research problems and decisions.

Assignment to sites.--To avoid systematic variation of teachers with treatments, assignment of teachers to test sites is made in such a way that all teachers participate equally in all treatment conditions. Such assignment is randomized as far as is practicable. Compromises in the random assignment of teachers to sites are necessary to coordinate teacher time schedules with available time

schedules at test sites, and to minimize cost and fatigue factors by assigning teachers to their own area of the city as often as possible.

Responsibilities at sites.--At least one teacher-assistant and the investigator share data gathering activities at each test site. These activities include distributing and collecting materials, giving initial instructions in using PI, leading students from one activity to another, giving oral pretests and posttests, and interviewing.

Supervision at test sites.--The investigator is present in all sessions at all sites as both a participant and an observer. Her presence enables certain teacher-generated errors and fluctuations in procedures to be observed and corrected, and provides for an on-the-job extension of classroom training.

### Coordinators

The successful execution of the present research requires a high level of cooperation from leaders in local community settings. Local coordinators are enlisted at each test site. The responsibilities of these persons include: (1) propagandizing the usefulness of the research to other local leaders; (2) publicizing the nutrition course to be offered among prospective students; (3) preenrolling qualified and interested students; (4) caring for physical

arrangements at test sites (buildings unlocked, equipment provided); and (5) helping during the sessions with routine activities, such as marking attendance and distributing materials.

One or more meetings are arranged with each coordinator before the actual data gathering at test sites in order to explain their responsibilities and to follow-up arrangements being made. In addition, each coordinator is supplied with a written list of his responsibilities.<sup>7</sup>

### Instruments

The instruments used in this research are reproduced in this dissertation as Appendices C, D, and E. Prior to data gathering, the instruments have been field-tested with sixteen informants similar to the research subjects in age, school experience, and social status. Modifications have been made as a result of the preliminary field work. The final, field-tested versions of the instruments are described and discussed below.

#### Questionnaire A

Questionnaire A (Appendix C-3) is designed to gather data on certain demographic, sociological, and personal characteristics of learners. It is administered

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<sup>7</sup>This description of coordinator responsibilities appears as Appendix B-2.

orally and individually during the second treatment session by the investigator or a teacher-assistant.

Some of the items in Questionnaire A have been used in previous investigations in a Brazilian milieu by Herzog (1970) and Kahl (1968). Other items are developed specifically for the present research.

Sex.--Item C-13 provides a record of the sex of the interviewee.

Age.--In Item C-14, 15 the interviewer record the interviewee's response to the question, "What is your age?"

Years of schooling.--In Item C-16, the interviewee's response to the question, "When you quit going to school, what year were you in?" is recorded.

Type of school experience.--An attempt is made to determine the type of schooling the interviewee has experienced, along a traditional-modern dimension. Three questions (Items C-17, C-18, and C-19) are used: (1) "In your school(s), did the students sit in rows or circles?" (2) "Did the students remain seated to answer the teacher's questions, or did they have to stand up?" (3) "Could the students move around in the classroom without asking permission, or did they have to remain seated and quiet?"

Occupation.--Descriptive information regarding the interviewee's occupation is gathered through the following questions:

"What is your work?"

"Who is your employer?"

"What do you do in your job?"

"Do you always do this, or do you sometimes do other things?"

In instances where the subject is unemployed (a housewife or student, for example), he is asked to name the principal wage-earner in his household,<sup>8</sup> and to describe the occupation of this person.

The descriptive information gleaned by answers to the above questions is classified in two ways: (1) according to major occupational groups, such as professional and clerical; and (2) according to the social grading of occupations within the culture. Both classifications are used because they yield somewhat different information. The former categorization separates occupations into broad fields of employment, such as services, sales, and production, while the latter classification assigns social status to the employment. Both kinds of information are useful in evaluating differences among learners on measures of learning.

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<sup>8</sup>The question used is, "Quem sustenta a casa?" ("Who sustains the house?").

The first classification appears as Item C-20 of Questionnaire A. Occupations are assigned to one of the following eight International Standard Classification of Occupations (International Labour Office 1969) categories:

- Professional, Technical, and Related Workers
- Administrative and Managerial Workers
- Clerical and Related Workers
- Sales Workers
- Service Workers
- Agricultural, Animal Husbandry, and Forestry Workers, Fishermen and Hunters
- Production and Related Workers, Transport Equipment Operators, and Labourers
- Workers not Classifiable by Occupation.

The second classification, appearing as Item C-21 of Questionnaire A, assigns occupations to one of six social statuses:

- Professional and high administrative
- Managerial and executive
- Higher grade inspectional, supervisory, and other non-manual
- Lower grade inspectional, supervisory and other non-manual
- Skilled manual and routine grades of non-manual
- Semi-skilled and unskilled manual
- Not classified

The latter classification is based on Hutchinson's (1957) social grading of thirty common Brazilian occupations. Many of the occupations reported by subjects in this research appear in Hutchinson's list, and are graded accordingly. Occupations not appearing in Hutchinson's list are assigned by Brazilian raters to the group which includes the most similar occupations. Inter-rater reliability is .90.





Previous residence.--The procedures for gathering and classifying information on previous residence combine methods used in earlier Brazilian studies by Herzog (1970) and Kahl (1968). Subjects are asked three questions:

1. "What state did you live in when you were ten years old?"
2. "Did you live in the interior,<sup>9</sup> or in a city?"
3. "What was the name of the place (or city)?"

The urbanity or rurality of the previous residence (Item C-22) is verified through population statistics for 1971 published by the Instituto Brasileiro de Geografia e Estatística. The criterion for urbanity is living in a community of 10,000 or more persons.

The state of previous residence (Item C-23) is coded by geographical region, according to a classification system described by Azevedo (1967). The regional classification of previous residence enables comparisons of learners from more developed areas with those from less developed areas. Since Item C-23 lists the regions of Brazil in order of their distance from São Paulo, a classification of previous residence in terms of geographical proximity to Brazil's major metropolis is also provided.

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<sup>9</sup>The "interior" includes largely rural areas which are geographically remote from major urban centers.

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Stability of residence in São Paulo.--In Item C-26, the interviewee is asked "How long have you lived here (in São Paulo)?" This information provides a stability of residence measure.

Religion and church attendance.--The last two items in Questionnaire A provide information on religion and church attendance. In Item C-28, the interviewee is asked how often he attends church. In Item C-29, he is asked to name his religion.

### Questionnaire B

Questionnaire B (Appendix C-4) attempts to measure modernity, or a composite of attitudes, beliefs, and behaviors characteristic of persons in highly urbanized, industrialized, and literate societies (Smith and Inkeles 1966) .

After considerable deliberation, an adaptation<sup>10</sup> of the Smith-Inkeles (1966) Minimum Scale of Individual

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<sup>10</sup>Three adaptations of the Smith-Inkeles instrument are made. One item (FS-3), asking for the subject's opinion on family planning, is politically and religiously explosive, and cannot be used. It is substituted by a less controversial item (FS-1) from the long form of the Smith-Inkeles scale: "What is the ideal number of children for a man like yourself?" Another substitution is made: Item RE-12 ("Do you think a man can be good without having any religion at all?") is substituted by long form item RE-11 ("What is most important in caring for a sick person, prayer or medical care?"). The latter item is considered better attuned to a religiously-oriented society than the former. A third adjustment of the instrument involves dropping one of the behavior information items (AC-1,2)

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Modernity, Short Forms 5 and 6 has been selected as a modernity measure in the present research. The primary reason for the choice is the broad application and good validation of the instrument.<sup>11</sup> Another reason for selecting the scale is a forced-choice format which minimizes an acquiescence response set and susceptibility to rote response.

### Questionnaire C

Questionnaire C (Appendix C-8) is administered during the last treatment session. The instrument has three functions: (1) to explore the possibility that certain rival hypotheses explain a part of the variance on dependent variable measures, (2) to provide a measure of mass-media exposure, and (3) to supply a measure of the student's home study pattern (working alone or with others).

Five items (C-50 to C-54) explore the student's history of exposure to nutrition information from other sources during the time period of the study. He is asked whether or not he heard anything on the radio, saw anything on television, or read anything in magazines, newspapers, or books which reminded him of the course. He is also asked whether or not he conversed with other persons about

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because similar information has already been provided through Questionnaire A (Item 28).

<sup>11</sup>Detailed validity and reliability information for this instrument is available (Smith and Inkeles 1966).

the course, and whether or not he attended other meetings in which nutrition was discussed. Although the primary function of items C-50 to C-54 is inquiring into history, during the study, they also have two secondary functions: (1) providing a measure of mass-media exposure (to radio, television, and literature); and (2) providing measure of affective response to the instruction (the degree of conversation about the course reported).

Items C-55 and C-56 inquire into the means of transportation to the class sessions, and the length of travel time required. Item C-57 explores the possibility of previous exposure to programmed instruction methodology on the part of the student. The last item, C-58, is a dependent variable measure. The student is asked, "When you did the home assignments, did you work alone or with other persons?"

Otis Mental Ability Test  
(Beta Level, Short Form)

A score on a group intelligence test is one of the literacy-related measures used in this research.

The Otis test utilized is an equivalent form of (the Northamerican Beta level test). The test was validated by the criterion of school success, and (shows) a high correlation with other tests of general intelligence. It was chosen (for the present research) because of (facility of) application (in group settings) and facility of manual correction. In Brazil, various

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forms of the test have been used in educational . . . and industrial sectors.<sup>12</sup>

Although the Otis instrument is less precise than most of the complex and individually administered tests, it affords a "satisfactory rough classification . . . (which) can be used with advantage . . . to segregate pupils into relatively homogeneous groups for . . . research purposes" (Yates 1959:499). For subjects in the present research, the correlation of the Otis test with years of schooling is .555; correlations with measures of content acquisition, transfer of training and retention of learning are in the .400 range.

### Exercise 1

Exercise 1 (Appendix D-2) is a criterion measure based on the instructional objectives of Lesson 1 in the nutrition unit. The exercise includes eight sentences, each of which is completed with the food group to which a given food belongs. Two examples of sentences from this exercise are: "Chicken belongs to the group of foods which build." "Pudding belongs to the group of foods with milk." The student's score is based on the number of correct answers to the eight items.

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<sup>12</sup>Paraphrased from an unpublished report (in Portuguese) on the intelligence testing phase of this investigation (Paternostro 1972).



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## Exercise 2

This exercise (Appendix D-3) is a criterion measure, based on the instructional objectives of Lesson 2 of the nutrition unit. Students are asked to supply correct numbers in the following sentence:

"Every day,

adults need to eat:

foods with milk \_\_\_\_\_ times;

foods that build \_\_\_\_\_ times;

foods that protect \_\_\_\_\_ times;

foods that give energy \_\_\_\_\_ times."

The score for this exercise is based on the number of correct answers to the items.

### Planejando Uma Dieta: Written Pretest-Posttest- Delayed Posttest

This problem-solving task, Planning A Diet (Appendix D-1), is a repeated measure from which several transfer, retention, and strategy scores are derived. Students are given a sheet of paper on which is printed a list of 38 foods and the following instructions:

Here is a list of foods. If you want to have an adequate diet, what foods will you eat tomorrow? You may make 13 choices from these foods. Write them one by one in the blank spaces in the order (you choose them).<sup>13</sup> Remember that you want good nutrition.

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<sup>13</sup>Portuguese, da escolha (of the choice).

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Don't rush. Plan your diet well. When you finish, take your list to the teacher.<sup>14</sup>

Oral Pretest-Posttest-  
Delayed Posttest

Immediately after planning his diet (above) the student is asked to give reasons for one of his choices. He is questioned in a private setting. The schedule used by the interviewer for this oral test is reproduced as Appendices C-2, C-5, and C-6. The interviewer first selects a frequently-chosen food which appears on the interviewee's list. The interviewer then records (in writing) the interviewee's responses to three questions:

"Can you show me where you wrote (food), please, so that I can check your choice on this paper?"

"Why did you choose (food)?"

"Are there other reasons why you chose (food)?"

The student's responses to the above questions are classified into six categories of reasons: pleasure, utility, habit, common sense, general knowledge, and course instruction. This classification allows measures of (1) transfer and retention (through course-based reasons given on posttests); (2) strategies employed in learning (through an analysis of tendency to add course-based reasons to earlier reasons, rather than dropping older reasons in

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<sup>14</sup>Translated from the Portuguese instrument

favor of newer ones), and (3) affective response to instruction (through pleasure reasons given). The inter-rater reliability of oral test scores is .82.

#### Programmed Instruction Manuals

The content, selection, development, and production of variations of a programmed nutrition unit are described later in this chapter. An analysis of student responses to programmed items from these units yields several dependent variable measures: (1) accuracy of responses; (2) tendency to copy feedback; (3) stability of responses; (4) completeness of responses; and (5) time required to complete the lessons. These measures reflect both strategies employed in learning and affective response to instruction.

#### Attendance Form

Attendance at three voluntary treatment sessions provides a measure of affective response to the instruction and setting. Appendix C-1 shows the form used in recording attendance. Space is provided for marking the student's presence at sessions, or giving reasons for his absence.

#### Instrument for Choosing PI or a Story Method

Appendix C-7 reproduces the instrument used in offering the student a choice between PI and a story. In a private interview setting, the student is shown two

booklets with identical covers, formats, color, and size.

The interviewer says,

We would like to give you a copy of Lesson 4 so that you can teach a friend. You may choose between two styles. One is programmed instruction, just like you studied in this course. The other says the same things, but is written like a story. Both of the books have the same teachings. The only difference is that one is a story (shows book) and the other is programmed instruction (shows book) like you just finished studying. Which of the two would you think it best to take, the programmed instruction or the story?<sup>15</sup>

The students' choice of a teaching method is expected to provide a measure of affective response to the PI methodology.

#### Session Observation Form

The Session Observation Form (reproduced as Appendix E) is completed at each treatment session at each testing site. The form provides a systematic record of setting variables: place, date, day of week, time of day, week of treatment, total attendance, presence of outside persons, illumination, ventilation, temperature, weather, physical appearance of classroom, size of classroom, furnishings available, improvisations necessary, interruptions, noise, confusion, cooperation of local leaders, responsibilities of personnel at the site (investigators, teachers, coordinators), fluctuations in treatment procedures, and fluctuations in human instrumentation. This

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<sup>15</sup>Translated from the Portuguese instrument.

form is also used for recording other observations, anecdotes, and critical incidents during treatment sessions. The insights and understandings gained through the systematic observations described here contribute to the interpretation of research findings and to the examination of certain rival hypotheses which might explain the variance on dependent variable measures.

#### The Nutrition Unit

Two variations of a programmed nutrition unit have been developed for this research. The content and methodology of the two versions of the unit are outlined in Appendix H.<sup>16</sup> Procedures and processes involved in preparing the programmed unit are described below.

#### Selection of a Programmed Instruction Unit

A programmed instruction unit is needed for this research which (1) is on a basic level, requiring no more than second-grade reading skills; (2) is adult in writing style, physical presentation, and content; (3) has objectives which are relevant to the cultures of the subjects; (4) has clearly ordered, logically developed content; (5) has immediate community and personal utility; (6) is useful to a wide diversity of persons of both sexes;

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<sup>16</sup>The programmed instruction units are available (in Portuguese) through the Institute for International Studies in Education, Michigan State University.

( 7) comprises a meaningful unit of study three to five hours long; and (8) requires no mechanical presentation devices.

A search for programmed instruction which meets these criteria has taken the investigator to the Entelek (1968) and Hendershot (1964) programmed instruction guides, to basic adult education literature and bibliographies of materials, to literature on PI in developing countries, and to interviews with specialists in instructional technology, adult education, and international education. The search has failed to uncover a program which meets most or all of the above criteria. The two alternatives which seem to be available are (1) to choose a programmed unit which is not appropriate to the target groups, and adapt the content and objectives; or (2) to choose a course of study which is appropriate to the culture, and program it. The second alternative is followed in this research. A nutrition unit developed in Brazil as a cooperative effort involving the Cruzada ABC, SUDENE, and AID has been selected (Cruzada ABC 1967).<sup>17</sup> This unit has been developed specifically for literacy efforts, and meets all the criteria above except the implicit requirement of being programmed.

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<sup>17</sup>The Cruzada is a literacy/adult education program with headquarters in Recife. SUDENE is a federal government agency which coordinates a variety of regional development programs in Northeast Brazil.



Characteristics of the Two  
Versions of the Programmed  
Instruction Unit

Two programmed versions of a basic nutrition unit are varied systematically along three dimensions of expository-discovery teaching described by Shulman (1970): (1) the degree of guidance provided, (2) the rule or egrule sequencing of instruction, and (3) the didactic or Socratic style of instruction.

The degree of guidance.--In the expository condition, the learners' behavior is more controlled, and convergent responses are reinforced. In the discovery condition, the student is given more freedom. Divergent responses are encouraged.

The sequence of instruction.--The expository program is more often ruleg, proceeding deductively from rules to examples. The discovery program is more often egrule; the student is given examples and encouraged to find the rules himself.

The didactic-Socratic dimension.--In the discovery program, a Socratic teaching style creates successive states of equilibrium and disequilibrium as problems are raised, tensions created, solutions formed, out of which new problems are raised. This style is contrasted with didactic teaching in which the student makes smooth progress through carefully planned, small instructional steps.

At the same time the programs are being varied along the above dimensions, an attempt is made to control and equate (1) the content, (2) the meaningfulness, and (3) the reading difficulty of the two versions.

The content is controlled on all dimensions except the thinking or cognitive behaviors required of the students (the latter vary systematically as the teaching styles are varied). The same instructional objectives, facts, concepts, principles, and illustrations are used in both versions of the program.

Equal meaningfulness is sought for both versions of the unit. Teaching methods which encourage rote learning are avoided. Every effort is made to contrast meaningful expository teaching with meaningful discovery teaching.

Equivalence of reading difficulty between the two versions of the unit is estimated by an analysis of 100-word passages selected from the beginning, middle, and end of each programmed lesson. For each passage selected, the number of sentences and the number of unfamiliar words<sup>18</sup> are counted. The results of this analysis for the final versions of the nutrition unit is shown in Appendix I. In the twenty-eight passages analyzed (fourteen from each version), the average number of sentences per 100 words is

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<sup>18</sup>Unfamiliar words are defined as those not included among the 2,500 most frequently used words in the Portuguese language. The source for word frequency information is Brown, Carr, and Shane (1945).

12.5 for the expository version and 12.8 for the discovery version. The overall frequency of unfamiliar words is 1.6 per 100 words in the expository unit, and 2.5 per hundred words in the discovery unit. Since Portuguese reading difficulty scales are not available, absolute grade levels or difficulty levels cannot be determined from this data. On an English-language scale (Spache 1953) the reading level of the expository program is second grade, first month, and for the discovery program second grade, second month. On a Spanish reading difficulty scale (Spaulding 1956) the expository unit has an overall score of 49 and the discovery unit an overall score of 51. Readings falling between 40 and 60 on the Spaulding scale are considered "very easy, offering maximum comprehension for the new reader" (Cruzada ABC 1965: XIe).

#### Procedures in Writing the Programmed Instruction Unit

The following methodology has been developed for writing the expository and discovery versions of the nutrition unit: (1) using a Gagné-type task analysis (Gagné 1965:150), behavioral objectives are determined for the unit, and for each lesson within the unit; (2) from these objectives, the basic concepts and principles to be taught are derived; (3) a rough draft of a "free-style" program is developed, representing a direct route to the objectives by way of PI, and giving little attention to the expository or discovery nature of the sequences. (The

emphasis here is on capturing a natural teaching style. The stylistic components of instruction tend to become stilted in attempts to write on the two extremes); (4) two non-programmed lesson plans are outlined as models of expository and discovery teaching. The question at this point is, "How would an experienced teacher reach these goals via the two methods?"; (5) using the expository lesson plan in [4] as a base, the free-style program is adjusted in an expository direction [since PI units developed from task analyses tend to be quite expository in nature, the adjustment in this direction is minimal]; (6) the teaching methods from the discovery lesson plan [4, above] are used to adjust the program in a discovery direction; (7) a systematic analysis of the two versions of the program is made (a) to determine whether or not the teaching methods in the two versions do indeed differ in their degrees of guidance, ruleg or egrule sequencing, and didactic or Socractic style, and (b) to determine whether or not the same instructional objectives, principles, concepts, facts, and illustrations are included in both programs. The two versions of the unit are cross-references frame by frame so that subtle similarities and differences between them can be compared and controlled. This cross-referencing method of comparison enables rather precise assessments of the content included and the pedagogy employed in each version of the unit.

### Cooperation in Writing the PI Unit

Cooperation is sought in writing the PI unit to verify the accuracy of the nutrition information offered, and to assist in attunements of the materials to the language and culture of the target group. To establish the accuracy of the nutrition information in the unit, standard current nutrition texts and a professional nutritionist are consulted. A Brazilian professor of adult education is helping to maximize the linguistic and cultural attunement of the materials.

### Empirical Testing of Programmed Lessons

The field testing of the programmed lessons involves two distinct steps: (1) individual testing, and (2) group testing.

Individual testing.--During the individual phase of the testing of materials, each programmed lesson is taught to three or four different informants, one at a time, in a private, across-the-table setting. The informants read frames aloud and make overt responses. Insights into the thinking processes of the students are provided through verbal and non-verbal behavioral cues. The investigator augments the information he gleans by asking probing questions (such as, "What are you thinking?"). He makes on-the-spot improvements in the program while the student is responding by adding written

Prompts to the frames, or breaking down the instruction into smaller steps. Observations and impressions are both hand and tape recorded. The resulting information furnishes the basis for the first revision of the lessons.

Group testing.--The revised lessons are tested a second time under group conditions which simulate as closely as possible the actual field setting in which they will be used. Groups of four or five students work alone or in teams, completing the lessons without teacher help. An item analysis of each student's response to each frame supplies the basis for the final revision of the PI lessons.

#### Production of the PI Unit

The final version of the programmed unit is mimeographed, one frame to a page. Large type, ample spacing, and a careful layout of frames are employed to maximize readability. Each lesson is collated as a separate booklet. The format and appearance of the expository and discovery versions of the lessons are identical except for the color of the covers.

#### Measures of Learner Characteristics (Independent Variables)

Differences among learners in literacy skills, modernity, and motivation to learn are considered independent variables in this research. The measures which are used for each of these variables are described below.

### Literacy Skills

Two indicators of probable levels of functional literacy are employed, years of schooling and scores on a group-form intelligence test.<sup>19</sup> The former measure is based on student response to a questionnaire item. The latter is derived from student responses to a Brazilian adaptation of the Otis Mental Ability Test, Beta Level, Short Form.

### Modernity

Measures of modernity are provided through learners' responses to items from three questionnaires. Questionnaire A includes items to determine (1) kind of school experience (along the modern-traditional dimension); (2) urbanity of previous residence; (3) geographical proximity of previous residence to São Paulo; (4) stability of present residence; and (5) social status and non-manual or manual classification of present occupation. Questionnaire B is an adaptation of the Smith-Inkeles (1966) scale of attitudinal modernity. Although Questionnaire C is designed primarily to disconfirm rival hypotheses growing out of intra-treatment histories of subjects and settings, three items from this questionnaire also provide an indication of differences among learners in mass media exposure.

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<sup>19</sup>"Literacy skills" refers, of course, to ability to read and write. In the present research the term is operationally defined as years of schooling and intelligence test scores. This somewhat arbitrary definition is

### Motivation to Learn

For reasons discussed earlier in this chapter, differences among learners in age, sex, and community participation are expected to influence motivation to learn, and, consequently, to affect gain scores on dependent variable measures. Measures of these variables are provided through items in Questionnaires A and C.

### Measures of Learning (Dependent Variables)

The present research makes use of multiple measures of learning in three domains: (1) achievement of informational objectives, (2) strategies employed in achieving objectives, and (3) affective responses toward instruction.

### Measures of Achievement of Information Objectives

Informational objectives for which achievement measures are provided include (1) content acquisition, (2) transfer of training, and (3) retention of learning. Because proponents of discovery teaching base the case for the superiority of their method (when compared with expository methods) on transfer and retention variables (Cronbach 1966), measures of these latter outcomes have been included along with the more usual measures of content acquisition.

justified by correlations between intelligence test scores and years of schooling (.55 in the present research), and between intelligence test scores and reading achievement (correlations in the .40 to .60 range are reported by Gray [1960]).



Acquisition of content.--The operational definition of content acquisition is scores on two criterion measures, Exercise 1 and Exercise 2. In Exercise 1, the student, when given a list of eight foods, writes opposite each food the food group to which it belongs. In Exercise 2, the student completes sentences by supplying the number of servings from a given food group which are required in an adequate daily diet. The two behaviors tested through Exercises 1 and 2 are prerequisite to the mastery of the transfer of training tasks discussed in the paragraph which follows.

Transfer of training.--Ability to use information in a problem solving situation is demonstrated in a transfer task. The students are required to select an adequate diet from a list of foods, and to give oral reasons for food choices which reflect an understanding of nutritional principles taught in the cursinho. Three Pretest-posttest gain scores are derived from the students' food choices and the reasons given for choices: two of the scores (evaluating the balance and variety of the diet the student plans) are derived from written tests. The third score (based on unprompted recall of principles taught in the cursinho) is derived from students' oral reasons for food choices.

Retention of learning.--The transfer of training tasks described in the preceding paragraph are repeated one week later as a delayed posttest. A repeated measures design enables comparisons of immediate gain scores on measures of learning with short-term retention scores on the same measures.

### Measures of Strategies Employed in Learning

This research attempts to observe not only the products of learning (measured through gain scores), but certain processes or strategies which the student employs while learning. An effort is made to distinguish reflective, thoughtful, and integrative strategies from rote, mechanical, impulsive strategies. In completing the PI manuals, possible indicators of effective (reflective, thoughtful, integrative) strategies include: (1) accurate responses to items, (2) no evidence of copying feedback; (3) stability of answers as evidenced through few erasures and changes; and (4) a relatively longer period of time spent on the lessons. In completing the written pretest-posttest possible indicators of effective strategies are (1) choosing popular, well-liked food items; (2) shifting focus of attention from one food group to another fewer times on posttests than on pretests;<sup>20</sup> (3) showing less

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<sup>20</sup>An efficient strategy for planning a diet would involve selecting foods by groups or by meals rather than shifting from group to group impulsively.

tendency toward unplanned choices on posttests than on pretests;<sup>21</sup> (4) showing less tendency toward a mechanical pattern of choices on posttests than on pretests;<sup>22</sup> (5) making fewer wild choices on posttests than on pretests;<sup>23</sup> (6) on posttests, adding new, course-based reasons for food choices to earlier (pretest) reasons, rather than dropping original reasons in favor of newer ones.<sup>24</sup> Since

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<sup>21</sup>This observation is made possible by a constraint in the pretest-posttest problem solving task: only 13 food choices are permitted. If the student does not plan carefully, he tends to choose too many foods from the first two groups and too few foods from the last two groups, because he runs out of blank spaces in which to write. The imbalanced pattern of choices resulting from this kind of behavior is called the HI-HI-LO-LO pattern.

<sup>22</sup>Mechanical behavior in making food choices is observed through a distracter in the pretest-posttest instrument: blank spaces are arranged below lists of foods such a way that the student who performs mechanically (without recalling principles) can easily and erroneously assume that the blanks must be filled only with foods from the printed column directly above them. When this mechanical behavior occurs, 1-2/3-4 pattern, with foods from Groups 1 and 2 written in the first column, and foods from Groups 3 and 4 in the second column, emerges.

<sup>23</sup>A thoughtful, balanced distribution of 13 foods in four groups requires choosing three or four foods from each group. If course instruction is recalled, two would also be a thoughtful number (two foods from the milk group are included in an adequate daily diet). Choosing only one food in a group, or more than five foods in a group, is considered wild or illogical behavior.

<sup>24</sup>Blending new reasons with the old may indicate that the new reasons have become a part of the student's thought and habit structures. When old reasons are dropped in favor of the new, it is possible that the student has established relationships between previous and newly acquired knowledge.

instruments used in gathering data on strategies (the pretest-immediate posttest-delayed posttest, and four PI manuals) allow repeated measures, changes in strategies over a given time period may be observed.

#### Measures of Affective Responses Toward Instruction

In this study, an attempt is made to observe positive responses toward the instruction and setting. Six measures of positive responses are utilized: (1) a higher rate of voluntary attendance at treatment sessions; (2) choosing a lesson in PI form rather than story form, when offered a choice between the two methods; (3) reporting extensive conversations with friends about the course; (4) completing PI lesson booklets rather than leaving frames blank; and (5) cooperating in a prescribed pattern of class interaction and home study (working alone or with others); and (6) giving affectively oriented reasons for food choices on posttests.

#### The Research Design

The design for this study calls for a four-cell participant-observer demonstration with repeated measures and four replications. It can be represented symbolically as follows:

<sup>25</sup> The two versions of the program are contrasted in Appendices II and I.

POSTTEST	O X a <sub>1</sub> O O
	-----1-----
POSTTEST	O X a <sub>2</sub> O O
	-----2-----
POSTTEST	O X b <sub>1</sub> O O
	-----1-----
POSTTEST	O X b <sub>2</sub> O O

Where O represents pretesting, posttesting, and delayed posttesting, X represents treatments, a and b represent treatment conditions along a program style dimension, and 1 and 2 represent treatment conditions along an instructional interaction dimension. Cells a<sub>1</sub>, a<sub>2</sub>, b<sub>1</sub>, and b<sub>2</sub> indicate combinations of conditions to be employed in treatments in a 2 x 2 factorial design. Dotted lines separating treatments indicate that intact groups are involved. Treatments will be replicated four times, so that a total of sixteen intact groups are involved.

Program style.--One treatment condition in this research is the style of PI used. Two versions of a basic nutrition unit have been prepared, one an expository version, and the other a guided discovery version.<sup>25</sup> The content, reading level, and meaningfulness of both versions of the unit are carefully controlled. They vary in the amount of guidance given the student, in the inductive or deductive quality of the logic employed, and in the didactic or Socratic nature of the presentation. The

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<sup>25</sup>The two versions of the program are contrasted in Appendices H and I.

expository program employs more guidance, more deductive logic, and a more didactic presentation, whereas the guided discovery program uses less guidance, more inductive logic, and a more Socratic presentation. Subjects in Cells a<sub>1</sub> and a<sub>2</sub> will be treated through the expository program condition, whereas subjects in Cells b<sub>1</sub> and b<sub>2</sub> will be treated through the guided discovery program condition.

Instructional interaction.--Conditions of interaction created in this research are individualized or bilateral interaction (in which a two-way interaction of the student with the programmed manual is primary) and group or multilateral interaction (in which students interact both with the program and among each other). In the individualized condition, students are instructed to work alone as they read a page (frame), do what the book asks, turn the page, check their answers, and go on with the lesson. In the group condition, students are instructed to work together as members of the group take turns reading a page; all do what is asked, all turn the page together, all check and discuss their answers, and then go on with the lesson. Cells a<sub>1</sub> and b<sub>1</sub> will be treated under a bilateral (individualized) condition of interaction, and Cells a<sub>2</sub> and b<sub>2</sub> will be treated under a multilateral (group) condition of interaction.

learning Treatments.--In Treatment a<sub>1</sub>, an expository (more guided, more deductive, more didactic) programmed unit is used. Students study alone. The interaction is of the student with the programmed manual. In Treatment a<sub>2</sub>, the expository programmed unit described above is also used, but the instructional interaction is multilateral, with members of the group interacting both with the program and among each other. In Treatment b<sub>1</sub> the discovery (less guided, more inductive, more Socratic) programmed unit is combined with bilateral (individualized) interaction.

In Treatment b<sub>2</sub>, the discovery program is combined with multilateral interaction involving both student-student and student-program relationships.

#### Questions and Hypotheses

The present study explores four primary questions and eight major hypotheses generated by these questions. These questions and hypotheses will be presented here. A rationale will then be provided for each hypothesis.

#### The Questions

Four primary questions are explored in this research: (1) whether or not in a Brazilian milieu learning occurs through PI; (2) whether or not increased cultural attainment of PI along two dimensions (instructional interaction and program style) facilitates

learning; (3) whether or not the nature of learners within a given society affects the degree to which PI facilitates learning; and (4) whether or not the nature of learners within a given society effects the degree to which certain cultural attainments of PI facilitate learning.

A given condition is considered a facilitator of learning if subjects treated by it, when compared with subjects treated under other conditions demonstrate higher achievement of content objectives, more effective strategies in achieving content objectives, and more positive affective responses to the instructional conditions.

Characteristics of learners which are examined in relation to PI (and cultural attainment of PI) focus upon literacy, modernity, and motivational factors.

### The Hypotheses

Specific hypotheses, growing out of the above

Questions are to be tested.

- H<sub>1</sub> Learning occurs through PI in a Brazilian milieu.
- H<sub>2</sub> PI treatment conditions differ (along dimensions of cultural attainment) in their relative effectiveness as facilitators of learning.
- H<sub>2a</sub> Instructional interaction. The group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned).



- H<sub>2b</sub> Program style. The expository program condition (more culturally attuned) is more effective than the guided discovery program condition (less culturally attuned).
- H<sub>3</sub> The literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>3a</sub> Schooling. Learners with more school experience learn more through PI than those with less school experience.
- H<sub>3b</sub> Intelligence. Learners with higher scores on an intelligence measure learn more through PI than those with lower scores.
- H<sub>4</sub> The modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>4a</sub> Kind of school experience. Learners who have experienced more modern schooling learn more through PI than those who have experienced less modern schooling.
- H<sub>4b</sub> Urbanity of previous residence. Learners who have resided in urban areas learn more through PI than those who have resided in rural areas.

H<sub>4c</sub> Geographical proximity of previous residence.

Learners who have resided near São Paulo learn more through PI than those who have resided farther from São Paulo.

H<sub>4d</sub> Stability of residence. Learners who are long-term residents of São Paulo learn more through PI than those who are recent arrivals in São Paulo.

H<sub>4e</sub> Attitudinal modernity. Learners with higher scores on an attitudinal modernity scale learn more through PI than those with lower scores on the scale.

H<sub>4f</sub> Media exposure. Learners with higher media exposure learn more through PI than those with lower media exposure.

H<sub>4g</sub> Occupation. Learners with higher social status jobs learn more through PI than those with lower social status jobs.

H<sub>5</sub> Motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning.

H<sub>5a</sub> Age. Older learners (more motivated) learn more through PI than younger learners (less motivated).

- H<sub>5b</sub> Sex. Women learn more through PI than men.
- H<sub>5c</sub> Community participation. Learners who are more active participants in a given community organization learn more through PI than those who are less active in the community organization.
- H<sub>6</sub> Cultural attunements of PI are relatively more productive for learners with lower literacy skills than for those with higher literacy skills.
- H<sub>6a</sub> The group interaction condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills.
- H<sub>6b</sub> The expository program condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills.
- H<sub>7</sub> Cultural attunements of PI are relatively more productive for traditional learners within a given society than for modern learners.

- H<sub>7a</sub> The group interaction condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners.
- H<sub>7b</sub> The expository program condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners.
- H<sub>8</sub> Cultural attunements of PI are relatively more productive for less motivated learners than for more motivated learners.
- H<sub>8a</sub> The group interaction condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners.
- H<sub>8b</sub> The expository program condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners.

#### Rationale for Hypotheses

The first hypothesis, that learning occurs through programmed instruction, has been overwhelmingly supported by previous research. Students do learn from PI:

. . . They learn from linear programs, from branching programs built on the Skinnerian model, from scrambled books of the Crowder type, from Pressey review tests with immediate knowledge of results, from programs on machines or programs in texts. Many kinds of students learn--college, high school, secondary, primary, preschool, adult, professional, skilled labor, clerical employees, military, deaf, retarded, imprisoned --every kind of student that programs have been tried on. Using programs, these students are able to learn mathematics and science at different levels, foreign languages, English language correctness, the details of the U.S. Constitution, spelling, electronics, computer science, psychology, statistics, business skills, reading skills, instrument flying rules, and many other subjects. The limits of the topics which can be studied efficiently by means of programs are not yet known (Schramm 1964:3,4).

It seems reasonable that learning through PI will also occur in a Brazilian milieu. Hypotheses 1 will be tested to discover whether or not learning does indeed take place.

The second hypothesis, that treatment conditions differ along dimensions of cultural attunement in their relative effectiveness as facilitators of learning, grows out of ethnopedagogical theory. A basic assumption of ethnopedagogy is that adjusting educational practice in the direction of cultural attunement will increase learning. Students of culture have observed the group-oriented nature of Latin societies (e.g., Kluckhohn and Strodtbeck 1961). They have also observed the prevalence of guided, deductive, didactic teaching with Latin cultures (e.g., Hall 1959). Since the cultural variables under consideration, individualized-group interaction and expository-discovery teaching styles, are also considered to be important teaching variables, adjustments of programmed

instruction along such dimensions in the direction of cultural attunements should facilitate learning. Hypothesis 2 will be tested to determine whether or not such a phenomenon does indeed occur.

Hypothesis 3 suggests that literacy skills are expected to affect achievement through PI. The literacy skills of students, operationalized in terms of years of schooling and scores on an intelligence measure are expected to be related to learning outcomes. North-american studies have shown high correlations between scores on IQ measures and achievement through PI (e.g., Woodruff, Faltz and Wagner 1966). It seems reasonable to suggest that similar relationships will be found in the Brazilian milieu. Hypothesis 3 will be tested to determine to what degree such relationships exist.

Hypothesis 4 states that differences among learners within a culture on modernity variables such as type of schooling, social status, urbanity, attitudinal modernity and media exposure are also expected to relate to effective learning through PI. Three lines of reasoning undergird this prediction. The first is based on what could be called a principle of learner similarity: when a teaching method developed in one culture is introduced to another culture, it is most likely to be effective with learners who have characteristics similar to those in the first culture, and least likely to be effective with learners

who differ from those in the first culture in some important way. If this premise is correct, it would logically follow that PI, which has developed in a modern, technological milieu, would be most effective with learners in other milieu who are similar to learners for whom and with whom the method was developed (i.e., modern learners).

The hypothesis that modernity is related to the effectiveness of PI may also be deduced through a second line of reasoning based on a principle of pedagogical familiarity: the degree to which the method employed fits the previous experience and expectation patterns of the learner will influence the response of the learner to the teaching method. A method which includes familiar components should elicit a more favorable response than a method which contains novel components. The components of PI methodology are modern in their origin. Thus they are likely to be better received, at least initially, by modern learners, for whom they are more familiar, than they would be to traditional learners, for whom the components of PI are less familiar.

A third line of reasoning also leads to the hypothesis that modern persons will learn more through PI than traditional persons. When PI is introduced into a culture, it constitutes an innovation, a new idea. Innovators and early adopters of innovations have shown higher scores on certain modernity measures than those who

are slower to adopt innovations (Rogers 1969:297,298). It follows that modern (more innovative) learners will accept a teaching innovation (PI) more readily than will traditional (less innovative) learners. Carrying this kind of logic another step, it seems reasonable to suggest that modern learners, who are more likely to accept PI, are also more likely to learn through the method than are those traditional learners who resist it. Hypothesis 4 will be tested to explore relationships between the modernity of learners and the effectiveness of PI as a facilitator of learning.

Hypothesis 5 suggests that variables of age, sex, and community participation, though quite independent of each other, are linked by a common factor, motivation to learn. It suggests further that motivation to learn will be related to effective learning through PI. The directional hypotheses are derived from two bases: (1) the intrinsic interest the subject matter is expected to hold for certain classes of learners; and (2) the extrinsic interest in group activities expected on the part of certain learners with habits of active community participation. Interest in the subject matter (nutrition) is expected to be greater on the part of women than of men, for the obvious reasons that women more often plan and prepare meals and are concerned for the health and well being of their husbands and children. Older people are



expected to be more interested in the subject matter than younger people for similar reasons involving family responsibility and concern about personal health which tends to increase with aging. Community participation on the part of learners is expected to relate to achievement through PI, particularly when, as is the case in several instances in the present research, PI takes place within a cohesive community structure. When a strong esprit de corps exists, the effectiveness of PI as a facilitator of learning should be enhanced. Hypothesis 5 will explore the extent to which motivation to learn is related to the effectiveness of learning through PI.

The essence of Hypotheses 6, 7, and 8 is that the cultural attunement of PI is more essential to learning for some learners than it is for others. The hypotheses state that cultural attunements of PI are relatively more productive for learners who are lower in literacy skills, less modern, and less motivated to learn. Highly literate, modern and motivated learners learn in spite of materials and methods which are poorly attuned to their culture. Their ability, interest, and exposure to modern ways help them to bridge the gap between the pedagogy and the culture. Less literate, less modern and less motivated learners cannot bridge the cultural gaps as well. Hence the cultural attunement of PI can be expected to be relatively more productive for this latter group of learners than for the former.

### Randomization Procedures

The present research requires coordination of the activities of several teachers with diverse groups of students in varied settings over a period of months. In spite of problems with randomization inherent in this kind of research plan, an effort has been made to give each group an equal chance to participate in each treatment, and to avoid systematic variations of treatments with setting variables which are likely to bias the findings. Initially, teachers are assigned to sites and to treatments through a table of random numbers. Adjustments in assignments of teachers and treatments have become necessary at several points during the field work to vary settings in which a given treatment is administered (avoiding more than one all-female group in each treatment, for example), and to deal with emergency situations such as a teacher missing an assignment because of a death in the family.

Four of the groups in this research have been formed in a literacy school setting where it has been possible to assign individuals to treatments through a two-step randomized procedure: (1) before the first session, a list of random student numbers is matched with random treatment numbers; and (2) as students arrive at the first session, they draw one of the previously-matched student numbers to determine their assignment to a treatment.

### Data Gathering Procedures

Three visits are made to each test site for data gathering purposes. An outline of activities at test sites is provided in Figure 1. A more detailed description of data gathering procedures follows here.

#### First Session

As the student arrives for the first session, his name is recorded on the cover of his individual data record book,<sup>26</sup> and his presence is marked on an attendance form. A brief explanation of the purpose of the project is made,<sup>27</sup> and the student is introduced to participating teachers and coordinators.

The student is then administered the written pretest, followed by the oral pretest. All oral tests and interviews are administered in as private a setting as possible.

When all students have arrived, the class is divided into small teams (for the group treatment), or told to work alone (in the individualized treatment).

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<sup>26</sup>The individual data record book mentioned here includes: (1) an attendance form; (2) oral pretest-posttest forms; (3) Questionnaires A, B, and C; and (4) form for choosing a PI or story booklet. It is reproduced as Appendix C.

<sup>27</sup>All subjects in all treatments are told that they are participating in a research project in which a new method (PI) is being field tested.

<u>SESSION 1. (First Week)</u>	<u>SESSION 2. (Second Week)</u>	<u>SESSION 3. (Third Week)</u>
Matriculate Student, Mark Attendance	Mark Attendance	Mark Attendance
Introduce Project and Personnel	Collect Lesson 2 (Homework)	Collect Lesson 4 (Homework)
Give Written Pretest	Give Exercise 2	Give Written Delayed Posttest
Give Oral Pretest	Give Lesson 3	Give Oral Delayed Posttest
Divide in Groups (group treatment only)	Interview: Questionnaires A, B (during Lesson 3)	Give Choice of PI or Story Booklet
Distribute Lesson 1	Give Written Posttest	Interview: Questionnaire C
Give Instructions for Using PI	Give Oral Posttest	Administer Otis IQ Test
Allow Students to Complete Lesson 1	Give Lesson 4 (Homework)	Distribute Certificates
Give Exercise 1		
Give Lesson 2 (Homework)		

Figure 1. A Summary of Data Gathering Activities.

Lesson 1 booklets are distributed, and the teacher-assistant gives instructions for using PI.<sup>28</sup>

The teacher-assistant helps all students in all treatments until the end of the first sequence (Lesson 1, Frame 8 in the expository version; or Lesson 1, Frame 15 in the discovery version).<sup>29</sup> Beyond this point, students work without further teacher help.

As soon as Lesson 1 is completed, the student is given Exercise 1. Upon completing this Exercise, he is assigned Lesson 2 for homework, with instructions to study alone (in the individualized treatment) or to work with colleagues (in the group treatment).

### Second Session

As the student arrives for the second session, attendance is marked and his home assignment (Lesson 2) is turned in. He is given Exercise 2 to complete.

As soon as individual students (in the individualized treatment) or small teams of students (in the group

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<sup>28</sup>Instructions for the individualized treatment are: (1) read the page, (2) do what the book says, (3) turn the page, (4) check your work, and (5) go on with the lesson. Instructions for the group treatment are: (1) one student reads the page, (2) all do what the book says, (3) all turn the page together, (4) all check and discuss their work, (5) another student reads the next page, etc. These instructions are explained by the teacher and displayed on classroom posters.

<sup>29</sup>More initial help is given with the discovery lesson (1) to cover the same informational content as the expository sequence, and (2) to compensate for the greater novelty of discovery methods and procedures.

treatment) finish Exercise 2, they begin Lesson 3. During Lesson 3, students are interviewed by a teacher-assistant or the investigator.<sup>30</sup> Questionnaires A and B are used for this interview.

Upon completing Lesson 3, the student is given the written and oral posttest.<sup>31</sup> He takes Lesson 4 home with him to study alone (in the individualized treatment) or with colleagues (in the group treatment).

### Third Session

During this final treatment session, attendance is marked, Lesson 4 (homework) is collected, and students are given the delayed written and oral posttests as retention measures.<sup>32</sup>

Following the oral posttest, in the same private setting, the student chooses a lesson booklet in PI or story form, and is interviewed with the schedule provided by Questionnaire C.

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<sup>30</sup>Students in all groups under all treatment conditions are interrupted from their work on Lesson 3, one at a time or a team at a time, for ten-minute interviews. This procedure is necessary because of time limitations.

<sup>31</sup>The oral posttest for each student is administered by the same teacher-assistant or investigator who gave the oral pretest.

<sup>32</sup>Lesson 4 provides instruction which is unrelated to the written posttest task, so that the sequence of instruction will allow a retention test during this last class session.

When all students have completed the retention tests and interviews (above), a group intelligence measure (Otis, Beta Level) is administered. The cursinho culminates with a short ceremony in which certificates are distributed to those who attended all treatment sessions and completed all home assignments.<sup>33</sup>

### Precautions

Several means of minimizing fluctuations and lapses in treatment procedures are employed in this research. First, a check list of artifacts and pre-treatment preparations is verified carefully before each session. Secondly, instruments, forms, and tests are kept in individual notebooks for each student to allow a continuous and readily available record of the student's progress through the treatment. Finally, "assembly line" cards, based on a task analysis of data gathering activities, are used during all sessions to organize materials, to standardize procedures, and to monitor and check data while it is being gathered. As an example of this system, the first four "assembly line cards" are translated and displayed in Figure 2.

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<sup>33</sup> This certificate is reproduced in Appendix J.

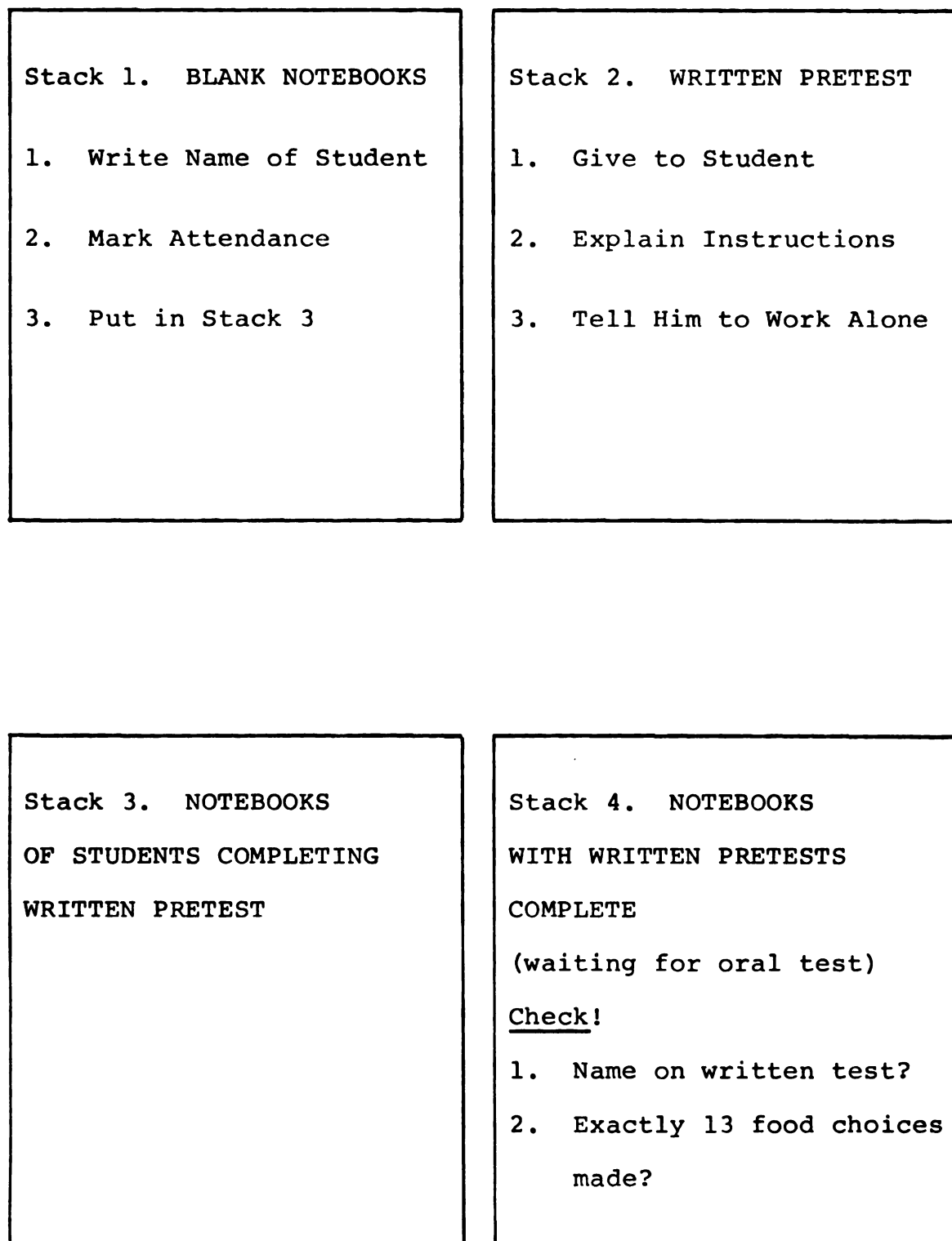


Figure 2. "Assembly Line" Cards Used in Treatment Sessions (translation of first four cards from Session 1).



### Procedures for Data Analysis

To test Hypothesis 1--that learning occurs through PI in a Brazilian milieu--analyses of variance of the means of selected pretest and posttest measured are examined.

To test Hypothesis 2--that PI treatment conditions differ (along dimensions of cultural attunement) in their relative effectiveness as facilitators of learning--analyses of variance are performed on all dependent variable measures in a two-way factorial design with individualized-group treatments on one dimension, and expository-discovery program style on a second dimension.

To test Hypotheses 3, 4, and 5--that the literacy skills, modernity, and motivation of learners affect the degree to which PI (under all treatment conditions) facilitates learning--simple and partial correlations among independent and dependent variables are ascertained.

To test Hypotheses 6, 7, and 8--that cultural attunements of PI are relatively more productive for learners who are less literate, less modern, and less motivated--two-way analyses of variance are computed for all dependent variables with levels of cultural attunement (expository-discovery or individualized-group treatments) on one dimension, and levels of literacy, modernity, and motivation (as measured through selected independent variables) on a second dimension.

### Summary

The research plan assumes that programmed instruction (PI) provides both a promising means of studying teaching and learning in developing countries and a useful vehicle for instruction. The plan calls for research conducted in the field (rather than in a laboratory), with the investigator functioning as both an experimenter and a participant-observer. Repeated observations of student behaviors are provided through (1) treatments extending over a three-week period, (2) multiple measures of learning outcomes, and (3) replications of treatments at geographically separated test sites.

The subjects in the present research are 145 youths and adults (ages 14-75) who reside in the metropolitan area of São Paulo, Brazil. They are voluntary participants in a three-session programmed course on nutrition given at sixteen testing sites throughout Greater São Paulo. The mean years of schooling for these subjects is 3.7. Eighty-three percent of them are employed in manual occupations with low social status.

Two versions of a programmed nutrition unit have been developed for this research. The versions are varied systematically along three dimensions of expository-discovery teaching described by Shulman (1970): (1) the degree of guidance provided, (2) the ruleg or egrule

sequencing of instruction, and (3) the didactic or Socratic style of instruction.

In addition, instruments have been adopted, adapted, and developed to provide measures of learner characteristics and measures of learning. Learner characteristics (independent variables) examined in this research include literacy skills, modernity, and motivation to learn. Dependent variables include content acquisition, transfer of training, retention of learning, strategies employed in learning, and affective response to instruction.

The research plan calls for a 2 x 2 factorial design with two variations of instructional interaction (individualized and group conditions) on one dimension, and variations of program style (expository and discovery conditions) on the other dimension.

Eight hypotheses are examined:

- H<sub>1</sub> Learning occurs in a Brazilian milieu through PI.
- H<sub>2</sub> PI treatment conditions differ (along dimensions of cultural attunement)<sup>34</sup> in their relative effectiveness as facilitators of learning.

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<sup>34</sup>Expository and group methods of instruction are considered to be more attuned to a Brazilian milieu than are discovery and individualized methods.

- H<sub>3</sub> The literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitate learning.
- H<sub>4</sub> The modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>5</sub> Motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning.
- H<sub>6</sub> Cultural attunements of PI are relatively more productive for learners with lower literacy skills than for those with higher literacy skills.
- H<sub>7</sub> Cultural attunements of PI are relatively more productive for less modern learners than for more modern learners.
- H<sub>8</sub> Cultural attunements of PI are relatively more productive for less motivated learners than for more motivated learners.

Data are gathered through three visits to each of the sixteen test sites. During the first session, the students are given a pretest, instruction on how to use programmed texts, Lesson 1, Exercise 1 (a criterion measure), and Lesson 2 for homework. During the second

session, the students complete Exercise 2 (criterion measure), Lesson 3, and the first posttest. They are given Lesson 4 for homework. Data on demographic and personal characteristics of the students are also gathered during the second session. During the third session, students are given a one-week retention test, an opportunity to choose between a programmed text and a lesson in story form, a post-treatment questionnaire, and an intelligence measure. Certificates for completion of the course are distributed.

Data analysis procedures call for analyses of variance and simple and partial correlations.

Findings resulting from analyses of data, and conclusions which may be drawn from these findings are discussed in the remaining chapters of the dissertation.

## CHAPTER IV

### ANALYSES OF DATA

This chapter is divided into three sections. In the first section, decisions regarding analyses of data are described. In the section which follows, findings resulting from statistical analyses are presented. The final section of the chapter provides a summary of findings.

#### Decisions

The findings discussed in this chapter grow out of decisions regarding (1) statistical techniques to be employed in this research, (2) the level of significance to be adopted, and (3) the data to be reported.

#### Statistical Techniques

Analysis of variance is the primary statistical technique employed in the present research.<sup>1</sup> Analysis of variance is considered an appropriate technique because (1) it reduces the number of calculations required in a

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<sup>1</sup>In addition, simple and partial correlations are used to study relationships between independent and dependent variables.

multidimensional, multivariate, factorially designed study, and (2) it enables an estimation of interaction effects.

Intact groups at geographically separated testing sites have been selected as the unit of analysis. Analyses of variance will be based upon sixteen cases (intact groups) distributed equally (4,4,4,4,) or unequally (3,5, 5,3) in four-cell designs. The small number of cases is problematic, reducing the likelihood of statistically significant findings. Since considerable interaction among subjects took place at each testing site, such a risk is an unavoidable alternative to serious violations of assumptions of independence of variances inherent in less conservative procedures.

#### Level of Significance

Findings reported in the present research reflect a belief that in a descriptive study loss of useful information is at least as serious as loss of statistical precision. In other words, criteria derived from principles of logical consistency and the applicability of findings should be combined with purely mathematical criteria in determining what shall be reported. Thus an effort is made to avoid either confirming hypotheses which should be disconfirmed or disconfirming hypotheses which should be confirmed. Care in reporting significance is combined with freedom in discussing trends. Significance of findings is reported at the .05 level of probability. Trends are

reported when they are consistent with theory, highly applicable to teaching, indicate useful directions for future research, and have an alpha level of at least .25. Pretest findings (based on data gathered before treatments were administered) are discussed only when they relate to trends reflected in posttests.

### Data to be Reported

Figure 3 summarizes independent, dependent, and treatment variables considered in this research. Independent variables include literacy skills, modernity, and motivation. Dependent variables include content acquisition, transfer of training, retention of learning, strategies employed in learning, and affective responses to instruction. Treatment variables include individualized-group and expository-discovery dimensions of programmed instruction (PI) in a 2 x 2 factorial design.<sup>2</sup>

This basically simple design is complicated through the use of multiple and/or repeated measures of variables. These measures are listed in Figure 3, and described in more detail in Figures 4 and 5. If each analysis performed on each measure of each variable were to be considered separately, more than 1,500 statistical findings would be reported and discussed in this research. Clearly a decision

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<sup>2</sup>Complete data are available through the Institute for International Studies in Education, Michigan State University.



TREATMENT VARIABLES

1. INDIVIDUALIZED-GROUP INTERACTION
2. EXPOSITORY-DISCOVERY PROGRAM

INDEPENDENT VARIABLES

1. LITERACY SKILLS
  - Intelligence Test Score
  - Years of Schooling
2. MODERNITY
  - Kind of School Experience
  - Urbanity of Previous Residence
  - Region of Previous Residence (distance from São Paulo)
  - Stability of Present Residence (in São Paulo)
  - Occupational Status
  - Attitudinal Modernity
  - Media Exposure
3. MOTIVATION
  - Age
  - Sex
  - Community Participation

DEPENDENT VARIABLES

1. ACQUISITION OF CONTENT
  - Exercise 1
  - Exercise 2
2. TRANSFER OF TRAINING
  - Balance of Diet
  - Variety of Diet
  - Unprompted Recall
  - of Course Information
3. RETENTION OF LEARNING
  - Balance of Diet
  - Variety of Diet
  - Unprompted Recall
  - of Course Information
4. STRATEGIES EMPLOYED (continued)
  - In Pretest-Posttest-Delayed Test:
    - "Pop" Choices
      - (choosing popular foods)
      - Shifting Focus Among Food Groups
      - HI-HI-LO-LO Pattern
      - (poor planning)
      - 1-2/3-4 Pattern
      - (mechanical responses)
    - Wild Choices
      - (random, thoughtless, responses)
      - Added Course Reasons to Earlier Reasons
      - (rather than dropping earlier reasons in favor of newer ones)
5. AFFECTIVE RESPONSES
  - Pleasure Reasons for Food Choices
  - Choosing PI instead of a Story
  - Conversations Reported about Course
  - Completeness of Programmed Lessons
  - Working Alone or With Others
  - Attendance at Sessions

Figure 3.--Summary of Variables.

<u>Name Used in Tables</u>	<u>Description</u>	<u>Coding and Scoring</u>
IQ Score	Otis Mental Ability Test Beta Level, Short Form	Raw scores 1 point for each correct item
Years of Schooling	Responses to Questionnaire A, Item C-16: "When you quit going to school, what year were you in?"	Number (in years)
Kind of Schooling	Response to Questionnaire A, Item C-18: "(In your school) did the students remain seated to answer the teacher's questions, or did they have to stand up?"	3--remained seated 2--sometimes seated, sometimes stood 1--stood
Urbanity of Previous Residence	Questionnaire A, Item C-22: based on student's report of his residence when he was ten years old.	2--urban 1--rural (urban=community of 10,000 or more)
Region of Previous Residence	Questionnaire A, Item C-23: based on student's report of his residence when he was ten years old.	Scored 9 (furthest from São Paulo) to 1 (nearest São Paulo)
Stability of Residence in São Paulo	Response to Questionnaire A, Item C-26: "How long have you lived here (in São Paulo)?"	Scored 9 (nine or more years) to 0 (less than a year)
Occupational Status	Questionnaire A, Item C-21: Classification based on Hutchinson's (1957) social grading of thirty common Brazilian occupations.	Scored 1 (high) to 6 (low)
Attitudinal Modernity	Questionnaire B: Smith-Inkeles (1966) Minimum Scale of Individual Modernity, Short Forms 5 and 6.	13 items Each scored 3 (modern) to 1 (traditional) Possible score, 39
Media Exposure	Response to Questionnaire C, Item C-51: "During these three weeks of classes, did you see something on television which reminded you of our course?"	2--yes 0--no
Sex	Questionnaire A, Item C-13: Interviewer's report.	1--male 0--female
Age	Questionnaire A, Items C-14,15: student's report.	Raw score (actual age) recorded
Community Participation	Response to Questionnaire A, Item C-28: "How often do you go to church?"	Scored 5 (more than once a week) to 0 (never)

Figure 4.--Measures of Independent Variables.

<u>Names Used in Tables</u>	<u>Description</u>	<u>Coding and Scoring</u>
<u>Exercise 1</u> (Criterion Measure)	Student, when given a list of eight foods, writes opposite each food the food group to which it belongs.	8 items 1 point for each correct response 8 points possible
<u>Exercise 2</u> (Criterion Measure)	Student completes sentences by supplying number of daily servings required from each of four food groups.	4 items 2 points for each correct response 8 points possible
<u>Balance of Diet</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	Student selects balanced diet from a list of foods.	2 points for each food group for which adequate number of foods selected 8 points possible
<u>Variety of Diet</u> (Repeated Measures: Posttest-Delayed Posttest)	In planning diet, student varies choices of foods from pretest to posttest and from posttest to delayed posttest.	Immediate posttest: 1 point for each food on posttest which did not appear on pretest Delayed posttest: 1 point for each food on delayed posttest that did not appear on posttest 13 points possible
<u>Unprompted Recall</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	Student gives oral reasons for choosing one food he chose in planning diet.	1 point for each reason which reflects principles and information taught in course
<u>Accuracy of Responses</u> (Four Measures: Lessons 1, 2, 3, and 4)	Student's responses to programmed instruction items agree with feedback provided by programmer.	Percent of accurate responses for each lesson
<u>Copying Feedback</u> (Four Measures: Lessons 1, 2, 3, and 4)	Student shows evidence of copying feedback.	1--evidence of copying feedback 0--no evidence of copying feedback
<u>Stability of Responses</u> (Four Measures: Lessons 1, 2, 3, and 4)	Student shows evidence of stable responses to program.	Percent of stable responses (those not changed during the lesson)
<u>Time Required</u> (Two Measures: Lessons 1 and 3)	Time required to complete programmed lessons in class.	Time spent (in minutes)
<u>"Pop Choices"</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	In planning diet, student chooses popular, well-liked foods.	Number of foods selected by student which are among the thirteen foods selected most frequently by all students (based on tally of pretest choices by subjects in study).

<u>Name Used in Tables</u>	<u>Description</u>	<u>Coding and Scoring</u>
<u>Shifting Focus</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	In planning diet, student shifts focus of attention from one food group to another, rather than systematically selecting foods from one group at a time.	1 point for each shift in focus
<u>HI-HI-LO-LO Pattern</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	In planning diet, only 13 food choices are permitted. If student does not plan carefully, he tends to choose too many foods from first two groups, and too few foods from last two groups.	1--HI-HI-LO-LO Pattern observed 0--HI-HI-LO-LO Pattern not observed
<u>1-2/3-4 Pattern</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	The pretest-posttest-delayed posttest instrument arranges blanks in such a way that the student who works mechanically (without recalling principles) fills blanks with foods printed in the column directly above them.	1--1-2/3-4 Pattern observed 2--1-2/3-4 Pattern not observed
<u>Wild Choices</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	Student's choice of only one food from a group or more than four foods from a group is considered thoughtless ("wild") behavior.	1 point for each food group with wild (only one or more than four) choices
<u>Added Course Reasons</u> (Repeated Measures: Pretest-Posttest- Delayed Posttest)	Student adds course-based reasons to earlier (pretest) reasons for food choices, rather than dropping earlier reasons in favor of newer ones.	2--added course reasons to earlier reasons 1--dropped earlier reasons in favor of newer ones
<u>Pleasure Reasons for Food Choices</u> (Repeated Measures: Pretest-Posttest-Delayed Posttest)	Student gives oral reasons for food choices which are affectively oriented (e.g., "I chose milk because I like it.")	1 point for each pleasure reason noted
<u>Choosing PI instead of a Story</u>	Student is offered a copy of Lesson 4 to teach a friend. He chooses between two teaching methods.	2--programmed instruction 1--story
<u>Conversations about Course</u>	Response to Questionnaire A, Item C-53: "During these three weeks of classes, did you talk with other persons about nutrition?"	2--a lot 1--a little 0--no
<u>Completeness of Programmed Lessons</u> (Four Measures: Lessons 1, 2, 3, and 4)	Student's tendency to complete programmed items, rather than to leave them blank.	Percent of complete items for each lesson
<u>Working Alone or With Others</u> (Five Measures: Lessons 1, 2, 3, 4, and Self-Report)	Student's preference for working alone or with others observed through responses to programmed lessons and self-report.	Lessons: 1--shows evidence of working with others 0--shows no evidence of working with others Self-Report: 2--worked with others 1--sometimes with others, sometimes alone 0--worked alone
<u>Attendance at Sessions</u>	Based on group attendance records.	Percent of students in each intact group who completed course

Figure 5.--Measures of Dependent Variables.

must be made either to delimit the study or to report findings holistically.

Since the design of this research is theoretically cohesive and the variables and measures employed are mutually ancillary, a decision has been made to report findings holistically. Significant findings and recurring trends are collated and combined into generalized observations. Such an emphasis on breadth and scope is consistent with the exploratory nature of the research.

### Findings

Statistical analyses performed to test hypotheses considered in this research, and findings resulting from these analyses, are described below.

#### Hypothesis 1

To test Hypothesis 1--that learning occurs through PI in a Brazilian milieu--analyses of variance of the means of selected pretest and posttest measures were performed. The results of these analyses are shown in Table 2. Post-test gains in ability to recall course information were significant at the .001 level. Tendencies to make fewer shifts in focus among food groups and to make fewer random, thoughtless responses (wild choices) on posttests were also significant at the .001 level. Posttest gains in ability to plan a balanced diet were significant at the .005 level. The data indicate that Hypothesis 1 is supported. Learning does occur through PI in a Brazilian milieu.

Table 2.--Analyses of Variance of Over-All Means on Selected Pretest-Posttest-Delayed Posttest Measures.

Measure	Pretest	Posttest	Delayed Posttest	F-ratio
Balance of Diet	1.87	3.62	3.28	13.96*
Unprompted Recall	.037	.531	.475	25.82**
Shifting Focus	6.57	5.16	5.13	21.35**
Wild Choices	1.46	.86	.89	15.09**

\*Significant at the .005 level.

\*\*Significant at the .001 level.

### Hypothesis 2

To test Hypothesis 2--that PI treatment conditions differ (along dimensions of cultural attunement) in their relative effectiveness as facilitators of learning--analyses of variance of group means were performed on dependent variable measures in a two-way factorial design with individualized-group interaction on one dimension, and expository-discovery program style on a second dimension. F-ratios were calculated for repeated measures of the main effects of the treatments (IG and ED) and for interactions of measures with treatments (M-IG and M-ED).

Hypothesis 2a.--Data related to Hypothesis 2a--that the group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned)--are shown in Tables 3, 4, and 5.

Table 3.--Analyses of Variance of Group Means on Scores on Measures of Content Acquisition, Transfer of Training, and Retention of Learning for Individualized (Ind) and Group (Grp) Treatments.

	Measure 1		Measure 2		Measure 3		F-ratio M-IG Interaction	Mean of Measures		F-ratio IG
	<u>Measure 1</u>		<u>Measure 2</u>		<u>Measure 3</u>			<u>Measures</u>		
	Ind	Grp	Ind	Grp	Ind	Grp		Ind	Grp	
Acquisition of Content										
Exercises 1 and 2	6.6	7.0	6.7	6.3	a	a	2.06*	6.6	6.7	.00
Transfer and Retention										
Balance of Diet	1.8	1.9	3.8	3.5	3.3	3.3	.17	3.0	2.9	.02
Variety of Diet	a	a	4.9	3.9	5.3	4.1	.23	4.4	4.7	.49
Unprompted Recall	.03	.05	.58	.43	.49	.53	.79	.34	.35	.02

\*Trend, not statistically significant.

<sup>a</sup>Measure not included in research plan.

Table 4.--Analyses of Variance of Group Means on Scores on Measures of Strategies Employed for Individualized (Ind) and Group (Grp) Treatments.

	Measure 1		Measure 2		Measure 3		Measure 4		F-ratio M-IG Interaction	Mean of Measures		F-ratio IG
	Ind	Grp	Ind	Grp	Ind	Grp	Ind	Grp		Ind	Grp	
<u>Strategies Related to Programmed Lessons</u>												
Accuracy of Responses	89.6	91.8	97.0	98.0	82.1	90.1	90.4	91.5	1.38*	89.8	92.8	1.63*
Copying Feedback	.19	.24	.25	.49	.11	.16	.15	.32	1.12	.17	.30	2.39*
Stability of Responses	99.4	98.6	98.0	97.5	97.9	97.9	98.5	98.0	.37	98.4	98.0	2.26*
Time Required	47.5	61.9	a	a	49.4	53.1	a	a	1.36	48.4	57.5	1.88*
<u>Strategies Related to the Pretest-Posttest-Delayed Posttest</u>												
"Pop" Choices	7.7	7.8	7.6	7.2	7.8	7.4	a	a	1.14	7.7	7.4	1.30
Shifting Focus	6.6	6.5	5.2	5.1	5.2	5.1	a	a	.00	5.7	5.6	.10
HI-HI-LO-LO-Pattern	.06	.14	.09	.17	.11	.17	a	a	.06	.08	.16	3.35*
1-2/3-4 Pattern	.14	.15	.12	.23	.25	.20	a	a	1.64*	.17	.19	1.19
Wild Choices	1.54	1.38	.90	.83	.93	.85	a	a	.09	1.12	1.02	.26
Added Course Reasons	1.9	1.9	1.8	1.8	1.7	1.8	a	a	1.00	1.8	1.8	.19

\*Trend, not statistically significant.

<sup>a</sup>Measure not included in research plan.



Table 5.--Analyses of Variance of Group Means on Scores on Measures of Affective Responses for Individualized (Ind) and Group (Grp) Treatments.

	Measure 1		Measure 2		Measure 3		Measure 4		F-Ratio M-IG Interaction	Mean of Measures		F-ratio IG
	Ind	Grp	Ind	Grp	Ind	Grp	Ind	Grp		Ind	Grp	
Pleasure Reasons for Food Choices (pretest-posttest-delayed posttest)	.69	.63	.63	.46	.59	.55	b	b	.41	.63	.55	.43
Choosing PI Instead of Story	1.43	1.49	a	a	a	a	a	a	a	a	a	.56
Conversations About Course	1.18	1.23	a	a	a	a	a	a	a	a	a	.13
Completeness of Programmed Lessons (Lessons 1, 2, 3, and 4)	94.3	94.8	99.4	98.9	93.3	97.0	96.9	97.9	.60	95.9	97.1	.57
Working Alone vs. With Others												
Observed (Lessons 1, 2, 3, and 4)	.09	.46	.09	.15	.06	.26	.06	.16	2.80*	.08	.26	2.51*
Self-Report	1.10	1.71	a	a	a	a	a	a	a	a	a	8.12**
Attendance at Sessions	77.2	80.1	a	a	a	a	a	a	a	a	a	.26

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

<sup>a</sup>Repeated measures were not included in the research plan.<sup>b</sup>A fourth measure was not included in the research plan.

Table 3 shows analyses of variance of means on measures of content acquisition, retention of learning, and transfer of training for individualized and group treatments. An interactive trend was noted toward higher scores in the group treatment on Exercise 1 (based on classwork) than on Exercise 2 (based on homework).

Table 4 shows analyses of variance of means on measures of strategies employed in individualized and group treatments. In performance on programmed lessons, trends were noted toward greater accuracy, more copying, less stable responses, and spending more time on programmed lessons in the group treatment. Interactive trends showed differences between individualized and group treatments on measures of accuracy to be more pronounced on Lessons 1 and 3 (completed in class) than on Lessons 2 and 4 (completed at home). In performance on the pretest-posttest-delayed posttest, a trend was noted toward poorer planning (more tendency toward a HI-HI-LO-LO Pattern of responses) on the part of subjects in the group treatment. An interactive trend was noted toward more mechanical responses (a 1-2/3-4 Pattern) on the immediate posttest and less mechanical responses on the delayed posttest on the part of subjects in the group treatment.

Table 5 shows analyses of variance of means on measures of affective responses to instruction in individualized and group treatments. An expected trend toward more work in groups on the part of students in the group

treatment was observed. An interactive trend was noted in which students showed a greater tendency to work together in class (Lessons 1 and 3) than at home (Lessons 2 and 4). Students in the group treatment--when compared with those in the individualized treatment--also reported working with others significantly more ( $p < .05$ ).

In summary, the above data revealed trends in which learners in the group treatment--when compared with those in the individualized treatment--achieved relatively higher scores on Exercise 1 (based on a class assignment) than on Exercise 2 (based on a home assignment), responded more accurately to programmed items, copied more feedback, made less stable responses, and spent more time on lessons. In addition, subjects in the group treatment--when compared with those in the individualized treatment--showed tendencies toward poorer planning and more mechanical responses on the posttest and less mechanical responses on the delayed post-test. Students in the group treatment also worked together more than students in the individualized treatment. These findings are not statistically significant,<sup>3</sup> and are somewhat contradictory. Hypothesis 2a--that the group interaction condition is more effective than the individualized condition--is not supported.

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<sup>3</sup>The only statistically significant finding noted has little practical significance: students in the group treatment worked together more than students in the individualized treatment!

Hypothesis 2b.--Data related to Hypothesis 2b--that the expository program condition (more culturally attuned) is more effective than the discovery program condition (less culturally attuned) are shown in Tables 6, 7, and 8.

Table 6 shows analyses of variance of means on measures of content acquisition, retention of learning, and transfer of training for expository and discovery treatments. Students in expository treatments achieved significantly higher ( $p < .05$ ) scores on measures of content acquisition. On one measure of transfer and retention (planning a balanced diet) an over-all trend was noted toward greater achievement in the expository treatment, as well as an interactive trend in which balance scores in the expository treatment showed losses on a one-week retention measure while discovery treatment scores showed gains.

Table 7 shows analyses of variance on measures of strategies employed in expository and discovery treatments. On programmed lessons, students in expository treatments worked significantly ( $p < .01$ ) more accurately, copied significantly ( $p < .05$ ) more feedback, and spent significantly ( $p < .01$ ) less time on lessons than students in discovery treatments. Significant interactions ( $p < .01$  or  $p < .05$ ) were noted between treatments and measures of strategies related to programmed lessons. The tendency for learners in the discovery treatment to work less accurately than those in the expository treatment was greater on lessons completed in class (Lessons 1 and 3). The tendency

Table 6.--Analyses of Variance of Group Means on Scores on Measures of Content Acquisition, Transfer of Training, and Retention of Learning for Expository (Exp) and Discovery (Dis) Treatments.

	Measure 1		Measure 2		Measure 3		F-ratio M-ED Interaction	Mean of Measures		F-ratio ED
	Exp	Dis	Exp	Dis	Exp	Dis		Exp	Dis	
Acquisition of Content										
Exercises 1 and 2	7.3	6.3	7.2	5.7	a	a	.84	7.3	6.0	8.03**
Transfer and Retention (pretest-posttest-delayed posttest)										
Balance of Diet	1.9	1.8	4.4	2.9	3.5	3.3	2.80*	3.3	2.6	1.99*
Variety of Diet	a	a	4.8	3.9	5.3	4.1	.63	4.3	4.7	.95
Unprompted Recall	.04	.04	.50	.56	.49	.46	.18	.34	.35	.02

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

<sup>a</sup>Measure not included in research plan.

Table 7.--Analyses of Variance of Group Means on Scores on Measures of Strategies Employed for Expository (Exp) and Discovery (Dis) Treatments.

	Measure 1		Measure 2		Measure 3		Measure 4		F-ratio M-ED Interaction	Mean of Measures		F-ratio ED
	Exp	Dis	Exp	Dis	Exp	Dis	Exp	Dis		Exp	Dis	
Strategies Related to Programmed Lessons												
Accuracy of Responses	98.6	82.8	98.6	96.4	96.8	75.5	96.9	85.0	7.98***	97.7	84.9	28.56***
Copying Feedback	.42	.01	.40	.35	.09	.17	.46	.01	8.95***	.34	.14	6.19***
Stability of Responses	98.8	99.3	98.0	97.5	97.5	98.3	98.0	98.5	1.15	98.1	98.4	1.14
Time Required	35.8	73.6	a	a	43.0	59.5	a	a	5.49**	39.4	66.6	16.93***
Strategies Related to the Pretest-Posttest-Delayed Posttest												
"Pop" Choices	7.6	7.9	7.4	7.4	7.4	7.7	a	a	.93	7.5	7.7	1.30
Shifting Focus	6.4	6.7	5.2	5.2	5.1	5.1	a	a	.33	5.6	5.7	.22
HI-HI-LO-LO Pattern	.11	.09	.05	.20	.14	.13	a	a	2.43*	.10	.14	.94
1-2/3-4 Pattern	.14	.16	.16	.18	.18	.27	a	a	.40	.16	.20	1.19
Wild Choices	1.40	1.51	.75	.98	.70	1.08	a	a	.58	.95	1.19	1.35
Added Course Reasons	1.9	1.9	1.8	1.8	1.6	1.9	a	a	3.13*	1.8	1.9	2.00*

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

<sup>a</sup>Measure not included in research plan.

Table 8.--Analyses of Variance of Group Means on Scores on Measures of Affective Responses for Expository (Exp) and Discovery (Dis) Treatments.

	Measure 1		Measure 2		Measure 3		Measure 4		F-ratio M-ED Interaction	Mean of Measures		F-ratio ED
	Exp	Dis	Exp	Dis	Exp	Dis	Exp	Dis		Exp	Dis	
Pleasure Reasons for Food Choices	.68	.64	.51	.58	.60	.54	b	b	.41	.60	.58	.01
Choosing PI Instead of Story	1.39	1.53	a	a	a	a	a	a	a	a	a	2.69*
Conversations about Course	1.23	1.18	a	a	a	a	a	a	a	a	a	.13
Completeness of Programmed Lessons	99.5	89.5	99.5	98.8	98.9	91.4	98.9	95.9	3.19*	99.2	93.9	11.43**
Working Alone vs. With Others												
Observed	.33	.23	.09	.15	.15	.18	.13	.10	.71	.17	.16	.01
Self-Report	1.30	1.51	a	a	a	a	a	a	a	a	a	.98
Attendance at Sessions	77.9	79.4	a	a	a	a	a	a	a	a	a	.07

\*Trend, not statistically significant.

\*\*Significant at the .01 level.

<sup>a</sup>Repeated measures were not included in the research plan.<sup>b</sup>A fourth measure was not included in the research plan.

to copy more feedback in the expository treatment than in the discovery treatment was greater on Lessons 1 and 4. The tendency to require more time to complete lessons in the discovery treatment than in the expository treatment was greater on Lesson 1 than on Lesson 3. On a posttest-delayed posttest measure of a tendency toward poor planning of responses (a HI-HI-LO-LO Pattern), a trend was noted toward interaction between measures and expository-discovery treatments. Learners in discovery treatments showed a greater tendency toward poor planning on the immediate posttest than on the delayed posttest, and learners in the expository treatment showed a greater tendency toward poor planning on the delayed posttest than on the immediate posttest. A greater tendency was also noted on the delayed posttest for students in the discovery treatment--when compared with students in the expository treatment--to add course-based reasons to earlier reasons for food choices rather than to drop earlier reasons for choices in favor of newer ones.

Table 8 shows analyses of variance of means on measures of affective responses to expository and discovery treatments. Programmed lessons of students in expository treatments were significantly more ( $p < .01$ ) complete than those of students in discovery treatments. These differences in completeness were greater on in-class lessons (Lessons 1 and 3) than on lessons completed at home



(Lessons 2 and 4). A trend was noted toward more choices of PI instead of a story in the discovery treatment than in the expository treatment.

To summarize, learners in expository treatments--when compared with those in discovery treatments--achieved significantly higher scores on measures of content acquisition, accuracy of programmed lessons, completeness of programmed lessons, and time required to complete programmed lessons. However, opposite trends were also noted in which learners in the discovery treatment--when compared with those in the expository treatment--showed relatively greater gains on measures of retention, a greater tendency to choose PI instead of a story, and significantly less tendency to copy feedback. The above data lend only partial support to Hypothesis 2b (that the expository treatment is more effective than the discovery treatment). Conflicting evidence makes any conclusions which may be drawn highly tenuous.

### Hypothesis 3

To test Hypothesis 3--that the literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning--simple correlations among independent variables (intelligence test score and years of schooling) and dependent variables (all measures of learning) were ascertained from individual case data. The results of these analyses are shown in Tables 9, 10 and 11.

Table 9.--Simple Correlations of Literacy Skills With Measures of Acquisition of Content, Transfer of Training, and Retention of Learning, From Individual Case Data.

Measures of Learning	IQ Score	Years of Schooling
<u>Acquisition of Content</u>		
Exercise 1	.439**	.269**
Exercise 2	.239**	.236**
<u>Transfer of Training</u>		
Balance of Diet	.341**	.229**
Variety of Diet	-.158	-.176*
Unprompted Recall	.094	-.010
<u>Retention of Learning</u>		
Balance of Diet	.339**	.195*
Variety of Diet	-.278**	-.180*
Unprompted Recall	.036	-.010

Critical Values: \*p < .05 = .163

\*\*p < .01 = .215

Table 10.--Simple Correlations of Literacy Skills With Strategies Employed in Learning, From Individual Case Data.

Measures of Learning	IQ Score	Years of Schooling
<u>Accuracy of Responses</u>		
Lesson 1	.266**	.247
Lesson 2	.178*	.102
Lesson 3	.247**	.311**
Lesson 4	.278**	.156
<u>Copying Feedback</u>		
Lesson 1	-.094	.044
Lesson 2	-.335**	-.170*
Lesson 3	-.010	-.084
Lesson 4	-.202*	.027
<u>Stability of Responses</u>		
Lesson 1	.207*	.108
Lesson 2	.137	.057
Lesson 3	.096	.130
Lesson 4	.166*	.116
<u>Time Required</u>		
Lesson 1	-.291**	-.245*
Lesson 3	-.337**	-.263**
<u>"Pop" Choices</u>		
Pretest	.169*	.117
Posttest	.292**	.166*
Delayed Posttest	.244**	.114
<u>Shifting Focus</u>		
Pretest	-.111	.030
Posttest	-.071	-.085
Delayed Posttest	-.130	-.169*
<u>Hi-Hi-Lo-Lo Pattern</u>		
Pretest	.017	-.068
Posttest	-.184*	-.125
Delayed Posttest	-.094	-.128
<u>1-2/3-4 Pattern</u>		
Pretest	.096	-.026
Posttest	-.133	-.139
Delayed Posttest	-.159	-.170*
<u>Wild Choices</u>		
Pretest	-.186*	-.180*
Posttest	-.374**	-.172*
Delayed Posttest	-.249**	-.064
<u>Added Course Reasons</u>		
Pretest to Posttest	.070	-.029
Pretest to Delayed Posttest	.185*	.069
Posttest to Delayed Posttest	.204*	.078

Critical Values: \*  $p < .05 = .163$ \*\*  $p < .01 = .215$

Table 11.--Simple Correlations of Literacy Skills With Affective Measures, From Individual Case Data.

Measures of Learning	IQ Score	Years of Schooling
<u>Pleasure Reasons for Food Choices</u>		
Pretest	.112	.153
Posttest	.181*	.090
Delayed Posttest	.127	.135
<u>Choosing PI Instead of Story</u>	-.084	-.174*
<u>Conversations About Course</u>	.144	.157
<u>Completeness of Programmed Lessons</u>		
Lesson 1	.260**	.218**
Lesson 2	.168*	.027
Lesson 3	.166*	.256**
Lesson 4	.198*	.002
<u>Working Alone vs. With Others</u>		
Lesson 1	-.104	-.023
Lesson 2 (at home)	-.179*	-.142
Lesson 3	-.007	.055
Lesson 4 (at home)	-.205*	-.152
Self-Report	-.043	-.062

Critical Values: \*  $p < .05 = .163$

\*\*  $p < .01 = .215$

Correlations of literacy skills with measures of content acquisition, transfer of training, and retention of learning are shown in Table 9. Correlations<sup>4</sup> were noted between greater literacy skills and (1) higher scores on measures of content acquisition, (2) higher scores on transfer and retention measures of ability to plan a balanced diet, and (3) lower scores on transfer and retention measures of ability to plan a varied diet.

Correlations of literacy skills with measures of strategies employed in learning are shown in Table 10. Correlations were noted between greater literacy skills and (1) more accurate responses to programmed lesson items, (2) less tendency to copy feedback, (3) more stable responses to programmed items, (4) less time spent on programmed lessons, (5) more choices of popular foods on the posttest and the delayed posttest, (6) less shifts in focus from one food group to another on the delayed posttest, (7) fewer unplanned (HI-HI-LO-LO Pattern) responses on the posttest, (8) fewer mechanical (1-2/3-4 Pattern) responses on the delayed posttest, (9) fewer thoughtless, random (wild) choices of foods on the posttest and delayed posttest, and (10) a tendency on posttests toward adding course-based

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<sup>4</sup>Correlations reported here have coefficients of at least .163. Assuming a bivariate normal population, correlations of this magnitude would be significant at the .05 level.

reasons for food choices to earlier reasons given, rather than to drop earlier reasons in favor of newer ones.

Correlations of literacy skills with affective responses to instruction are shown in Table 11. Correlations were noted between greater literacy skills and (1) giving more pleasure reasons for food choices, (2) choosing a story instead of programmed instruction, (3) doing more complete work on programmed lessons, and (4) preferring to work alone rather than with others.

The above data support Hypothesis 3. Literacy skills do affect the degree to which PI (under all treatment conditions) facilitates learning. Persons with greater literacy skills learn more through PI than those with less literacy skills.<sup>5</sup>

#### Hypothesis 4

To test Hypothesis 4, that the modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning, zero-order and partial correlations<sup>6</sup> among modernity variables and

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<sup>5</sup>Three exceptions to this generalization--negative correlations of literacy skills with (1) ability to plan a varied diet, (2) a tendency to choose PI instead of a story, and (3) a tendency to work with others--are discussed in Chapter V.

<sup>6</sup>Partial correlations (with intelligence test scores partialled out) were included in the analysis of data in an effort to avoid confounding the effects of intelligence with effects attributable to modernity variables. Correlations of intelligence with both modernity variables and measures of learning made this procedure desirable.

dependent variables were ascertained from individual case data. The results of these analyses are shown in Tables 12, 13, and 14.

Correlations of modernity variables with measures of content acquisition, transfer of training, and retention of learning are shown in Table 12. With intelligence test scores partialled out, correlations were noted between measures of modernity and measures of retention of learning: (1) higher occupational status was correlated with greater ability to plan a balanced diet; (2) urbanity was correlated with greater ability to plan a varied diet; and (3) a greater distance of the region of previous residence from São Paulo was correlated with higher scores on a measure of unprompted recall of course information.

Correlations of modernity variables with strategies employed in learning are shown in Table 13. With intelligence test scores partialled out, correlations were noted between measures of modernity and measures of strategies employed in learning: (1) copying of feedback was negatively correlated with urbanity; (2) longer time required to complete programmed lessons was correlated with urbanity and higher media exposure; (3) choices of popular foods were negatively correlated with urbanity; (4) a greater tendency toward an unplanned (HI-HI-LO-LO) pattern of choices was correlated with the distance of the region of previous residence from São Paulo and with a lower occupational status; (5) a tendency toward a mechanical

Table 12.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Modernity Measures With Measures of Acquisition of Content, Transfer of Training, and Retention of Learning, From Individual Case Data.

Measures of Learning	Kind of School Experience		Urbanity of Previous Residence		Region of Previous Residence		Stability of Residence in São Paulo		Occupational Status		Attitudinal Modernity		Media Exposure	
	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation	Zero-Order	Partial Correlation
<u>Acquisition of Content</u>														
Exercise 1	-.257**	-.138	.040	-.071	-.074	.009	.029	-.090	-.138	-.039	.083	-.083	.016	-.052
Exercise 2	-.207*	-.142	-.036	-.098	-.037	.012	-.032	-.097	-.143	-.091	.046	-.042	.110	.079
<u>Transfer of Training</u>														
Balance of Diet	-.163*	-.060	-.032	-.123	-.196*	-.138	.174*	.099	-.094	-.014	.028	-.105	.071	.024
Variety of Diet	-.021	-.076	-.053	-.016	.051	.020	.085	.130	.040	.002	.044	.108	-.039	-.017
Unprompted Recall	-.019	.012	-.020	-.044	-.062	-.044	.097	.076	-.085	-.065	-.018	-.055	.024	.011
<u>Retention of Learning</u>														
Balance of Diet	-.128	-.022	.054	-.028	-.190*	-.132	.157	.080	-.270**	-.207*	.134	.017	-.028	-.083
Variety of Diet	.024	-.071	.166	.195*	.046	-.010	-.033	.038	-.025	-.098	-.055	.048	-.043	-.003
Unprompted Recall	-.109	-.103	-.019	-.028	.156	.167*	-.029	-.039	-.132	-.127	-.072	-.091	.067	.063

<sup>a</sup>With intelligence test scores partialled out.

Critical Values: \*  $p < .05$  = .163

\*\*  $p < .01$  = .215



Table 13.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Modernity Measures With Strategies Employed in Learning, From Individual Case Data.

Measures of Learning	Kind of School Experience		Urbanity of Previous Residence		Region of Previous Residence		Stability of Residence in São Paulo		Occupational Status		Attitudinal Modernity		Media Exposure	
	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation
Accuracy of Responses														
Lesson 1	-.208*	-.135	-.029	-.098	-.095	-.044	.107	.044	-.103	-.042	-.012	-.117	.089	.053
Lesson 2	.043	.107	-.088	-.136	-.003	.034	.023	-.022	-.072	-.031	.017	-.050	-.100	-.129
Lesson 3	-.134	-.060	-.091	-.159	-.033	.018	.063	.002	-.032	.029	.050	-.041	.005	-.032
Lesson 4	-.062	.030	-.151	-.232**	-.082	-.028	.058	-.011	-.012	.058	-.004	-.113	.034	-.006
Copying Feedback														
Lesson 1	.137	.113	-.116	-.097	-.010	-.030	-.055	-.033	.101	.081	-.107	-.079	-.053	-.040
Lesson 2	.153	.051	-.021	.063	.107	.043	-.221**	-.151	.169*	.097	-.110	.009	-.015	.036
Lesson 3	.029	.027	.151	.158	-.083	-.087	-.102	-.103	.006	.004	-.028	-.026	-.092	-.092
Lesson 4	.008	-.061	-.278**	-.242**	.193	.159	-.148	-.103	.107	.062	-.179*	-.118	-.025	.004
Stability of Responses														
Lesson 1	-.112	-.049	.024	-.026	-.176*	-.140	.197*	.154	-.137	-.092	.128	.060	.073	.045
Lesson 2	-.057	-.016	-.097	-.133	-.059	-.033	.068	.037	-.080	-.050	.029	-.019	.017	-.002
Lesson 3	.038	.073	-.070	-.096	-.115	-.098	.052	.029	-.073	-.052	-.019	-.057	.046	.033
Lesson 4	-.001	.038	-.109	-.141	-.056	-.034	.096	.070	-.091	-.066	.027	-.015	.073	.057
Time Required														
Lesson 1	.123	.033	.057	.135	-.031	-.095	-.117	-.049	.056	-.015	-.074	.032	-.015	.028
Lesson 3	.099	-.010	.119	.217**	-.003	-.077	-.047	.040	.065	-.017	-.035	.095	.177	.178*
"Pop" Choices														
Pretest	-.046	.009	.073	.035	-.093	-.061	.119	.081	-.019	.022	.160	.109	.052	.028
Posttest	-.039	.060	.007	-.067	-.121	-.067	.174*	.110	-.098	-.030	.117	.016	.031	-.012
Delayed Posttest	-.058	.022	-.118	-.186*	-.116	-.070	.143	.088	.006	.068	.093	.008	-.003	-.040

Table 13.--Continued.

Measures of Learning	Kind of School Experience		Urbanity of Previous Residence		Region of Previous Residence		Stability of Residence in São Paulo		Occupational Status		Attitudinal Modernity		Media Exposure	
	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation
<b>Shifting Focus</b>														
Pretest	.004	-.033	-.004	.023	-.115	-.141	-.069	-.043	-.022	-.050	-.024	.016	-.124	-.110
Posttest	-.016	-.041	.101	.122	.024	.010	.012	.031	-.088	-.109	-.085	-.064	.083	.095
Delayed Posttest	.060	.019	.024	.057	-.031	-.059	.051	.087	-.068	-.103	.004	.054	-.032	-.013
<b>HI-HI-LO-LO Pattern</b>														
Pretest	.053	.062	-.007	-.011	.172*	.179*	-.067	-.073	.006	.010	-.034	-.043	-.040	-.043
Posttest	.055	-.005	.060	.109	.114	.080	.065	.116	.006	-.040	-.112	-.051	-.144	-.121
Delayed Posttest	-.003	-.035	-.129	-.110	.126	.110	-.057	-.035	.201*	.185*	-.091	-.062	.016	.030
<b>1-2/3-4 Pattern</b>														
Pretest	.036	.071	-.084	-.110	.053	.074	.067	.045	-.009	.014	-.126	-.172*	.005	-.009
Posttest	.008	-.037	-.237**	-.213*	.107	.083	-.151	-.123	.124	.096	-.037	.011	.043	.063
Delayed Posttest	.136	.091	-.088	-.053	.221**	.195*	-.116	-.080	.161	.128	-.057	-.001	-.013	.010
<b>Wild Choices</b>														
Pretest	.063	.003	.077	.127	.009	-.030	.030	.080	.018	-.028	.016	.089	.002	.030
Posttest	.262**	.162	.046	.149	.096	.023	-.150	-.064	.201*	.124	-.037	.109	.034	.096
Delayed Posttest	.119	.043	.031	.095	.195*	.153	-.152	-.096	.147	.093	-.113	-.028	.084	.125
<b>Added Course Reasons</b>														
Pretest to Posttest	-.185*	-.172*	.189*	.178*	-.179*	-.169*	.168*	.156	-.223**	-.213*	-.019	-.047	-.075	-.086
Pretest to Delayed Posttest	-.135	-.081	-.002	-.048	-.146	-.113	.354**	.324**	-.238**	-.203*	-.204*	-.293**	-.057	-.086
Posttest to Delayed Posttest	-.458**	-.423**	.077	.030	-.098	-.059	.262**	.223**	-.182**	-.140	-.091	-.178*	.048	.019

\*With intelligence test scores partialled out.

Critical Values: \*  $p < .05 = .163$ \*\*  $p < .01 = .215$

Table 14.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Modernity Measures With Affective Measures, From Individual Case Data.

Measures Of Learning	Kind of School Experience		Urbanity of Previous Residence		Region of Previous Residence		Stability of Residence in Sao Paulo		Occupational Status		Attitudinal Modernity		Media Exposure	
	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation
<u>Pleasure Reasons for Food Choices</u>														
Pretest	.028	.068	.028	.002	.088	.114	-.043	-.073	-.187*	-.166*	.047	.008	.132	.118
Posttest	.066	.133	.096	.056	-.062	-.027	-.077	-.128	-.129	-.090	.079	.017	-.051	-.079
Delayed Posttest	-.129	-.094	-.071	-.105	-.053	-.028	.090	.061	-.063	-.034	-.044	-.096	.024	.006
Choosing PL Instead of Story	-.053	-.085	-.025	-.005	-.049	-.067	.074	.098	.033	.013	-.078	-.052	.060	.073
Conversations About Course	-.151	-.112	-.021	-.057	-.209*	-.186*	.280**	.255**	-.151	-.121	.020	-.033	.229**	.213*
<u>Completeness of Programmed Lessons</u>														
Lesson 1	-.244**	-.176*	-.011	-.077	-.048	.005	.045	-.021	-.071	-.009	-.019	-.122	.103	.069
Lesson 2	-.033	.022	-.078	-.123	-.118	-.087	.164*	.128	-.115	-.078	-.054	-.123	.011	-.014
Lesson 3	-.126	-.078	-.034	-.076	-.089	-.058	.112	.074	-.019	.022	.080	.023	.083	.061
Lesson 4	-.071	-.008	-.141	-.197*	-.098	-.061	.046	-.003	.103	.158	-.068	-.150	.085	.058
<u>Working Alone vs. With Others</u>														
Lesson 1	-.122	-.165*	-.142	-.122	-.137	-.162	.051	.080	.070	.047	-.212*	-.188*	-.063	-.049
Lesson 2	-.060	-.126	-.095	-.055	-.132	-.174*	.139	.192*	-.175*	-.228**	-.245**	-.198*	-.063	-.038
Lesson 3	-.213*	-.227**	-.015	-.014	-.099	-.103	-.109	-.111	.015	.014	-.080	-.083	-.118	-.118
Lesson 4	-.038	-.112	-.168*	-.126	-.086	-.133	.055	.112	-.046	-.100	-.259**	-.204*	-.110	-.083
Self-Report	-.134	-.156	-.132	-.126	-.078	-.089	.224**	.242**	-.140	-.155	-.163*	-.158	-.034	-.028

<sup>a</sup>With intelligence test scores partialled out.Critical Values: \*  $p < .05 = .163$ \*\*  $p < .01 = .215$

(1-2/3-4) pattern of choices was negatively correlated with urbanity, attitudinal modernity, and proximity of the region of previous residence to São Paulo; and (6) adding course-based reasons for food choices to earlier reasons given was positively correlated with urbanity, proximity of previous residence to São Paulo, length of previous residence to São Paulo, stability of present residence in São Paulo, and higher occupational status; adding course-based reasons for food choices to earlier reasons given was negatively correlated with modern school experience and attitudinal modernity.

Correlations of modernity variables with affective responses to instruction are shown in Table 14. With intelligence test scores partialled out, correlations were noted between measures of modernity and measures of affective responses to instruction: (1) giving pleasure reasons for food choices was correlated with higher occupational status; (2) reporting conversations about the course was correlated with the proximity of the region of previous residence to São Paulo, with the stability of residence in São Paulo, and with higher media exposure; (3) completeness of programmed lessons was negatively correlated with modern school experience and urbanity; and (4) working with others was positively correlated with the proximity of previous residence to São Paulo, with stability of residence in São Paulo, and with higher occupational status; working with others was negatively

correlated with modern school experience and attitudinal modernity.

The above correlations of modernity measures and measures of learning are scattered and not always in the direction hypothesized.<sup>7</sup> Hypothesis 4 is only partially supported. Evidence that the modernity of learners affects the degree to which PI facilitates learning is not conclusive.

#### Hypothesis 5

To test Hypothesis 5--that motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning--zero-order and partial correlations<sup>8</sup> among motivational variables (sex, age, and community participation) and dependent variables (measures of learning) were ascertained from individual case data. The results of these analyses are shown in Tables 15, 16, and 17.

Correlations of motivational variables with measures of content acquisition, transfer of training, and retention of learning are shown in Table 15. With

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<sup>7</sup>Correlations which fail to support the hypothesis are discussed in Chapter V.

<sup>8</sup>Partial correlations (with intelligence test scores partialled out) were included in the analysis of data in an effort to avoid confounding the effects of intelligence with effects attributable to motivational variables. Correlations of intelligence with both motivational variables and measures of learning made this procedure desirable.

Table 15.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Motivational Factors With Measures of Acquisition of Content, Transfer of Training, and Retention of Learning, From Individual Case Data.

	Sex		Age		Community Participation	
	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation	Zero-Order Correlation	Partial Correlation
<u>Acquisition of Content</u>						
Exercise 1	-.210*	-.149	.056	.018	.328**	.231**
Exercise 2	-.157	-.120	-.044	-.068	.261**	.205*
<u>Transfer of Training</u>						
Balance of Diet	-.280**	-.237**	-.038	-.074	.244**	.158
Variety of Diet	.161	.137	.175*	.193*	.052	.105
Unprompted Recall	-.017	.000	.224**	.217**	.102	.078
<u>Retention of Learning</u>						
Balance of Diet	-.144	-.090	.091	.064	.200*	.110
Variety of Diet	.175*	.133	.036	.064	.028	.121
Unprompted Recall	.007	.014	.084	.081	.125	.120

<sup>a</sup>With intelligence test scores partialled out.

Critical Values: \*  $p < .05 = .163$

\*\*  $p < .01 = .215$

Table 16.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Motivational Factors With Strategies Employed in Learning, From Individual Case Data.

Measures of Learning	Sex		Age		Community Participation	
	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation
<u>Accuracy of Responses</u>						
Lesson 1	-.156	-.114	-.145	-.177*	.228**	.161
Lesson 2	-.052	-.021	.094	.079	.027	-.028
Lesson 3	-.072	-.029	-.085	-.112	.201*	.138
Lesson 4	-.021	.030	-.082	-.112	.176*	.101
<u>Copying Feedback</u>						
Lesson 1	-.039	-.057	-.130	-.122	-.074	-.048
Lesson 2	.312**	.272**	-.163*	-.141	-.302**	-.224**
Lesson 3	.044	.043	-.060	-.059	-.041	-.040
Lesson 4	.173*	.142	-.138	-.122	-.068	-.008
<u>Stability of Responses</u>						
Lesson 1	-.052	-.016	.140	.124	.012	-.053
Lesson 2	.018	.043	.063	.052	.045	.006
Lesson 3	-.138	-.123	-.174*	-.184*	-.126	-.163*
Lesson 4	-.081	-.062	.091	.081	-.040	-.079
<u>Time Required</u>						
Lesson 1	.018	-.036	.072	.104	-.041	.050
Lesson 3	.171*	.119	.166*	.210*	-.153	-.058
<u>"Pop" Choices</u>						
Pretest	-.202*	-.177*	.044	.029	.024	-.028
Posttest	-.102	-.053	.076	.052	-.020	-.118
Delayed Posttest	-.188*	-.151	.098	.078	-.006	-.085
<u>Shifting Focus</u>						
Pretest	.119	.101	-.165*	-.156	.047	.085
Posttest	-.052	-.066	.054	.061	.016	.039
Delayed Posttest	.067	.045	.175*	.189*	.002	.044
<u>HI-HI-LO-LO Pattern</u>						
Pretest	-.002	.001	.024	.023	-.070	-.079
Posttest	.075	.044	.187*	.208*	.097	.162
Delayed Posttest	.146	.132	-.025	-.016	-.001	.029
<u>1-2/3-4 Pattern</u>						
Pretest	-.064	-.048	.076	.068	-.040	-.072
Posttest	.077	.055	-.095	-.084	-.124	-.089
Delayed Posttest	.188*	.164*	-.115	-.102	.025	.077
<u>Wild Choices</u>						
Pretest	.012	-.022	.004	.022	-.078	-.024
Posttest	.300**	.255**	-.075	-.044	-.339**	-.257**
Delayed Posttest	.174*	.136	-.205*	-.189*	-.293**	-.236**
<u>Added Course Reasons</u>						
Pretest to Posttest	.115	.130	.195*	.190*	.276**	.268**
Pretest to Delayed Posttest	-.102	-.071	.149	.135	.124	.073
Posttest to Delayed Posttest	-.200*	-.170*	.031	.013	.336**	.294**

<sup>a</sup>With intelligence test scores partialled out.Critical Values: \*  $p < .05 = .163$ \*\*  $p < .01 = .215$

Table 17.--Zero-Order and First-Order Partial Correlations<sup>a</sup> of Motivational Factors With Affective Measures, From Individual Case Data.

Measures of Learning	Sex		Age		Community Participation	
	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation	Zero- Order Corre- lation	Partial Corre- lation
<u>Pleasure Reasons for Food Choices</u>						
Pretest	-.125	-.107	-.056	-.067	-.102	-.143
Posttest	-.054	.022	.085	.070	-.040	-.100
Delayed Posttest	-.153	-.133	-.053	-.065	-.080	-.125
<u>Choosing PI Instead of Story</u>						
	.174*	.162	.147	.156	-.008	.018
<u>Conversations About Course</u>						
	-.263**	-.244**	.215**	.205*	.117	.078
<u>Completeness of Programmed Lessons</u>						
Lesson 1	-.182*	-.143	-.098	-.127	.203*	.136
Lesson 2	-.071	-.042	.085	.071	.058	.008
Lesson 3	-.060	-.031	-.024	-.040	.186*	.145
Lesson 4	.043	.081	-.065	-.085	.182*	.133
<u>Working Alone vs. With Others</u>						
Lesson 1	-.121	-.143	-.014	-.004	.226**	.271**
Lesson 2	-.008	-.041	.237**	.259**	.121	.186*
Lesson 3	-.085	-.088	-.051	-.051	.038	.042
Lesson 4	-.045	-.085	.065	.086	.040	.109
Self-Report	-.177*	-.188*	.220**	.225**	.179*	.201*

<sup>a</sup>With intelligence test scores partialled out.

Critical Values: \*  $p < .05 = .163$

\*\*  $p < .01 = .215$



intelligence test scores partialled out, a correlation was noted between female sex and higher scores on a transfer of training task (balance of diet). A correlation was also noted between age and higher scores on two transfer of training tasks (the variety of food choices made, and the unprompted oral recall of course information). In addition, correlations were noted between community participation and higher scores on both measures of content acquisition.

Correlations of motivational variables with measures of strategies employed in learning are shown in Table 16. With intelligence test scores partialled out, correlations were noted between female sex and less copying of feedback on Lesson 2 (completed at home), less tendency toward a mechanical (1-2/3-4) pattern of responses on the delayed posttest, less tendency toward thoughtless (wild) choices of foods on the posttest, and (on one measure) a greater tendency to add course-based reasons to earlier reasons given for food choices rather than to drop earlier reasons in favor of newer ones. Correlations were noted between age and more errors on the first programmed lesson, less stable answers on the third programmed lesson, longer time spent on the third programmed lesson, poorer planning (a HI-HI-LO-LO pattern) of responses on the immediate posttest, more thoughtful responses (fewer wild choices) on the delayed posttest, and (on the immediate posttest) a greater tendency to add course-based reasons to earlier reasons for food choices rather than to drop earlier

reasons in favor of newer ones. Correlations were noted between community participation and less copying of feedback on Lesson 2, more stable responses on Lesson 3, fewer thoughtless (wild) choices of foods on the posttest and the delayed posttest, and (on two measures) a greater tendency to add course-based reasons to earlier reasons for food choices, rather than to drop earlier reasons in favor of newer ones.

Correlations of motivational variables with measures of affective responses to instruction are shown in Table 17. With intelligence test scores partialled out, correlations were noted between female sex and (1) self-reports of working with others on home assignments, and (2) more self-reports of conversations about the course. Correlations were noted between age and (1) more self-reports of conversations about PI, and (2) more working with others on home assignments (observed in Lesson 2, and reported by students). Correlations were noted between community participation and a greater tendency to work with others (observed in the first two programmed lessons, and reported by the students).

The above data provide limited but consistent support for Hypothesis 5--that motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning--on two measures (sex and community participation). Mixed and inconclusive findings fail to support the hypothesis on a measure of age. Thus

Hypothesis 5 is partially supported. When motivation is operationally defined in terms of sex and community participation, more motivated learners appear to achieve more through PI than do less motivated learners.

#### Hypothesis 6

To test Hypothesis 6--that cultural attunements of PI are relatively more productive for learners with lower literacy skills than for those with higher literacy skills --two-way analyses of variance were computed for all dependent variables with levels of cultural attunement of PI (expository-discovery or individualized-group treatments) on one dimension and levels of literacy (determined by ranking intact groups according to means on an intelligence test measure) on a second dimension.<sup>9</sup>

Hypothesis 6a.--Data related to Hypothesis 6a--that the group treatment (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills--are shown in Tables 18, 19, and 20.

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<sup>9</sup>Groups were categorized as either "high literacy" or "low literacy" groups. High literacy groups were those whose mean scores on an intelligence test (Otis Mental Ability Test, Beta level, short form) were higher than the over-all mean. Low literacy groups were those whose mean scores on the intelligence test were lower than the over-all mean. All groups were included in the analysis. Thus a total of sixteen cases (means for intact groups) were considered.

Table 18.--Analyses of Interactions Between Literacy Skills and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Ind	Grp	Ind	Grp	
<u>Acquisition of Content</u>					
Exercise 1	7.50	7.80	5.75	6.25	.05
Exercise 2	7.18	6.43	6.13	6.15	.41
<u>Transfer of Training</u>					
Balance of Diet	5.03	4.03	2.48	2.95	.84
Variety of Diet	4.75	5.15	5.08	5.33	.02
Unprompted Recall	.60	.45	.55	.53	.11
<u>Retention of Learning</u>					
Balance of Diet	4.03	3.18	2.53	3.38	4.98*
Variety of Diet	3.98	3.98	3.85	4.20	.34
Unprompted Recall	.38	.53	.48	.53	.11

\*Significant at the .05 level.

Table 19.--Analyses of Interactions Between Literacy Skills and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Ind	Grp	Ind	Grp	
<u>Accuracy of Responses</u>					
Lesson 1	94.8	98.0	84.5	85.5	.04
Lesson 2	98.0	98.5	96.0	97.5	.24
Lesson 3	92.3	92.0	72.0	88.3	1.69*
Lesson 4	93.3	93.8	87.5	89.3	.03
<u>Copying Feedback</u>					
Lesson 1	.23	.18	.15	.30	.70
Lesson 2	.12	.16	.38	.82	4.75**
Lesson 3	.07	.13	.15	.19	.01
Lesson 4	.09	.22	.21	.42	.05
<u>Stability of Responses</u>					
Lesson 1	99.5	99.0	99.3	98.3	.46
Lesson 2	98.3	97.5	97.8	97.5	.13
Lesson 3	97.3	98.0	98.5	97.8	6.00**
Lesson 4	98.5	98.5	98.5	97.5	.50
<u>Time Required</u>					
Lesson 1	34.3	50.5	60.8	73.3	.02
Lesson 3	42.8	47.3	56.0	59.0	.01
<u>"Pop" Choices</u>					
Pretest	7.68	7.73	7.76	7.78	.01
Posttest	7.68	7.38	7.48	7.03	.09
Delayed Posttest	7.78	7.60	7.73	7.18	.74
<u>Shifting Focus</u>					
Pretest	6.38	6.55	6.83	6.53	.37
Posttest	5.25	4.93	5.13	5.33	.55
Delayed Posttest	5.30	4.83	5.03	5.35	1.39*
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.04	.13	.08	.16	.00
Posttest	.02	.19	.16	.16	1.08
Delayed Posttest	.10	.20	.12	.14	.51
<u>1-2/3-4 Pattern</u>					
Pretest	.10	.14	.18	.16	.31
Posttest	.08	.18	.16	.27	.00
Delayed Posttest	.16	.14	.33	.26	.12
<u>Wild Choices</u>					
Pretest	1.55	1.30	1.53	1.45	.28
Posttest	.53	.63	1.28	1.03	.61
Delayed Posttest	.30	.85	1.55	.85	12.10***
<u>Added Course Reasons</u>					
Pretest to Posttest	1.95	1.88	1.75	1.88	1.63
Pretest to Delayed Posttest	1.88	1.83	1.75	1.68	.01
Posttest to Delayed Posttest	1.63	1.95	1.78	1.73	1.49

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 20.--Analyses of Interactions Between Literacy Skills and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Ind	Grp	Ind	Grp	
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.85	.63	.53	.63	1.10
Posttest	.68	.60	.58	.33	.37
Delayed Posttest	.65	.63	.53	.48	.01
<u>Choosing PI Instead of Story</u>	1.35	1.60	1.50	1.38	5.32**
<u>Conversations About Course</u>	1.25	1.40	1.10	1.05	.67
<u>Completeness of Programmed Lessons</u>					
Lesson 1	97.8	99.3	90.8	90.3	.04
Lesson 2	99.3	99.5	99.5	98.3	4.91**
Lesson 3	97.5	97.5	89.0	96.5	2.04*
Lesson 4	96.8	99.0	97.0	96.8	.67
<u>Working Alone vs. With Others</u>					
Lesson 1	.00	.55	.18	.38	1.18
Lesson 2	.00	.08	.18	.23	.01
Lesson 3	.00	.25	.13	.28	.15
Lesson 4	.00	.08	.13	.25	.03
Self-Report	1.05	2.00	1.15	1.43	3.09*
<u>Attendance</u>	73.5	81.1	80.9	79.2	.67

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

Table 18 shows the results of analyses of interacting between literacy skills and individualized-group treatments on measures of acquisition of content, transfer of training and retention of learning. A significant interaction ( $p < .05$ ) was noted on a retention measure (planning a balanced diet). Learners with lower literacy skills achieved relatively higher scores in the group treatment, whereas learners with higher literacy skills achieved relatively higher scores in the individualized treatment.

Table 19 shows the results of analyses of interactions between literacy skills and individualized-group treatments on measures of strategies employed in learning. A trend toward interaction was noted on a measure of accuracy of the programmed lessons (Lesson 3). Learners with higher literacy skills made equally accurate responses in both treatments, while learners with lower literacy skills made relatively more accurate responses in the group condition. A significant interaction ( $p < .05$ ) was noted between literacy skills and individualized-group treatments on a measure of the tendency to copy feedback on the first home assignment (Lesson 2). Learners with lower literacy skills--when compared with learners with higher literacy skills--revealed a relatively greater tendency to copy feedback in the group treatment than in the individualized treatment. On the second lesson completed in class (Lesson 3) a significant interaction ( $p < .05$ ) was noted

between the literacy skills of learners and individualized-group treatments on a measure of stable responses. Learners with higher literacy skills made more stable responses in the group treatment than in the individualized treatment, whereas learners with lower literacy skills made more stable responses in the individualized treatment than in the group treatment. An interactive trend was noted on the delayed posttest measure of a tendency to shift focus of attention among food groups. Learners with higher literacy skills shifted focus of attention more often in the individualized treatment than in the group treatment, while learners with less literacy skills shifted focus of attention more often in the group treatment than in the individualized treatment. An interaction significant at the .01 level was noted between the literacy skills of learners and individualized-group treatments on a delayed posttest measure of thoughtless, random (wild) choices of foods. Learners with higher literacy skills made fewer wild choices in the individualized treatment, while learners with lower literacy skills made fewer wild choices in the group treatment.

Table 20 shows the results of analyses of interactions between literacy skills and individualized-group treatments on measures of affective responses to instruction. A significant interaction ( $p < .05$ ) was noted between literacy skills and individualized-group treatments on a measure of the tendency to choose PI instead of a story. Learners with higher literacy skills chose PI more



often in the group treatment, whereas learners with lower literacy skills chose PI more often in the individualized treatment. Interactions were noted between literacy skills and individualized-group treatments on two measures of completeness of programmed lessons. On Lesson 2 (completed at home) learners with lower literacy skills had significantly ( $p < .05$ ) more complete lessons in the individualized treatment than in the group treatment. On Lesson 3 (completed in class) learners with lower literacy skills had more complete lessons in the group treatment than in the individualized treatment. An interactive trend was noted on a self-report of working alone or with others on home lessons. Learners with lower literacy skills, when compared with those with higher literacy skills--reported relatively less work with others in the group treatment and relatively more work with others in the individualized treatment.

In summary, the group treatment appears to be relatively more productive for learners with lower literacy skills than for those with higher literacy skills on measures of retention of course information, accurate responses to instruction, and thoughtful responses on the posttests. In contrast, the group treatment appears to be relatively less productive for learners with lower literacy skills than for those with higher literacy skills on measures of tendencies to copy feedback, to make stable responses to programmed items, to shift focus of attention among food groups, to choose PI instead of a story, and to

cooperate in the prescribed pattern of interaction (working alone or with others). Thus Hypothesis 6a is only partially supported. Evidence that the group treatment is relatively more productive for learners with lower literacy skills than for those with higher literacy skills is contradictory and inconclusive.

Hypothesis 6b.--Data related to Hypothesis 6b--that the expository treatment (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills--are shown in Tables 21, 22, and 23.

Table 21 shows the results of analyses of interactions between literacy skills and expository-discovery treatments on measures of acquisition of content, transfer of training, and retention of learning. An interactive trend was noted on one measure of transfer of training (unprompted recall of course information). Learners with higher literacy skills showed a greater tendency to recall course information in the expository treatment, while learners with lower literacy skills showed a greater tendency to recall course information in the discovery treatment.

Table 22 shows the results of analyses of interactions between literacy skills and expository-discovery treatments on measures of strategies employed in learning. Significant interactions ( $p < .05$ ) were noted on measures

Table 21.--Analyses of Interactions Between Literacy Skills and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Exp	Dis	Exp	Dis	
<u>Acquisition of Content</u>					
Exercise 1	7.80	7.40	6.53	5.68	.28
Exercise 2	7.50	5.63	6.73	5.78	.90
<u>Transfer of Training</u>					
Balance of Diet	5.16	3.47	3.07	2.50	.52
Variety of Diet	4.84	5.13	4.83	5.42	.08
Unprompted Recall	.58	.43	.37	.64	1.31*
<u>Retention of Learning</u>					
Balance of Diet	3.76	3.33	2.97	2.94	.19
Variety of Diet	4.00	3.93	3.70	4.22	.95
Unprompted Recall	.52	.33	.43	.54	.94

\*Trend, not statistically significant.

Table 22.--Analyses of Interactions Between Literacy Skills and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Exp	Dis	Exp	Dis	
<u>Accuracy of Responses</u>					
Lesson 1	98.2	93.3	99.3	76.4	5.62**
Lesson 2	98.6	97.7	98.7	95.6	1.43*
Lesson 3	96.2	85.3	97.7	69.6	4.39**
Lesson 4	96.6	88.3	97.3	83.0	2.68*
<u>Copying Feedback</u>					
Lesson 1	.33	.00	.56	.02	8.77***
Lesson 2	.14	.14	.81	.47	2.38*
Lesson 3	.04	.19	.17	.16	.90*
Lesson 4	.25	.00	.81	.02	14.5***
<u>Stability of Responses</u>					
Lesson 1	99.0	99.7	98.3	99.0	.00
Lesson 2	98.4	97.0	97.3	97.8	1.90*
Lesson 3	97.2	98.3	98.0	98.2	2.30*
Lesson 4	98.6	98.3	97.0	98.6	1.86*
<u>Time Required</u>					
Lesson 1	31.6	60.3	42.7	81.6	.28
Lesson 3	40.6	52.3	47.0	63.8	.15
<u>"Pop" Choices</u>					
Pretest	7.52	8.00	7.67	7.84	.25
Posttest	7.38	7.77	7.43	7.14	1.61*
Delayed Posttest	7.52	7.97	7.20	7.60	.01
<u>Shifting Focus</u>					
Pretest	6.38	6.60	6.43	6.82	.04
Posttest	5.10	5.07	5.27	5.20	.00
Delayed Posttest	5.14	4.93	5.13	5.22	.16
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.14	.00	.06	.15	2.96
Posttest	.05	.19	.06	.21	.00
Delayed Posttest	.15	.14	.13	.12	.00
<u>1-2/3-4 Pattern</u>					
Pretest	.13	.10	.14	.19	.90
Posttest	.12	.14	.23	.20	.11
Delayed Posttest	.15	.14	.22	.34	1.35
<u>Wild Choices</u>					
Pretest	1.30	1.63	1.57	1.44	1.94*
Posttest	.40	.87	1.33	1.04	3.27*
Delayed Posttest	.38	.90	1.23	1.18	1.41*
<u>Added Course Reasons</u>					
Pretest to Posttest	1.90	1.93	1.77	1.84	.06
Pretest to Delayed Posttest	1.92	1.73	1.57	1.80	5.20**
Posttest to Delayed Posttest	1.66	2.00	1.53	1.88	.00

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 23.--Analyses of Interactions Between Literacy Skills and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Literacy		Low Literacy		F-ratio
	Exp	Dis	Exp	Dis	
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.72	.77	.60	.56	.07
Posttest	.58	.73	.40	.48	.06
Delayed Posttest	.62	.67	.57	.46	.23
<u>Choosing PI Instead of Story</u>	1.40	1.60	1.37	1.48	.23
<u>Conversations About Course</u>	1.32	1.33	1.07	1.08	.00
<u>Completeness of Programmed Lessons</u>					
Lesson 1	99.4	97.0	99.7	85.0	2.44*
Lesson 2	99.6	99.0	99.3	98.6	.03
Lesson 3	98.8	95.3	99.0	89.0	2.06*
Lesson 4	98.8	96.3	99.0	95.6	.11
<u>Working Alone vs. With Others</u>					
Lesson 1	.24	.33	.47	.16	1.04
Lesson 2	.00	.10	.23	.18	.48
Lesson 3	.08	.20	.27	.16	.62
Lesson 4	.00	.10	.33	.10	1.35*
Self-Report	1.26	1.97	1.37	1.24	2.83*

\*Trend, not statistically significant.

of the accuracy of programmed lessons completed in class (Lessons 1 and 3), and similar interactive trends were noted on measures of the accuracy of programmed lessons completed at home (Lessons 2 and 4). Learners with lower literacy skills, when compared with those with higher literacy skills, responded relatively more accurately in expository lessons, and relatively less accurately in discovery lessons. Significant interactions ( $p < .01$ ) were noted on two measures of a tendency to copy feedback (Lessons 1 and 4); similar interactive trends were noted on other measures of this tendency (Lessons 2 and 3). Learners with lower literacy skills--when compared with those with higher literacy skills--showed a relatively greater tendency to copy feedback in expository lessons. Interactive trends were noted on three measures of the stability of responses to programmed items. On Lessons 2 and 4 (completed at home), the responses of learners with lower literacy skills were more stable in discovery lessons, whereas the responses of learners with higher literacy skills were more stable in expository lessons. On Lesson 3 (completed in class), learners with lower literacy skills--when compared with those with higher literacy skills--gave relatively more stable responses to expository lessons. An interactive trend was noted on a posttest measure of choices of popular foods. Learners with lower literacy skills made more choices of popular foods in the expository treatment, while learners with higher literacy skills made more choices of

popular foods in the discovery treatment. Interactive trends were noted on all measures of thoughtless (wild) choices of foods. Learners with lower literacy skills made fewer thoughtless choices in the discovery treatment, whereas learners with higher literacy skills made fewer thoughtless choices in the expository treatment. A significant ( $p < .05$ ) interaction was noted on a pretest to delayed posttest measure of a tendency to add course-based reasons for food choices to earlier reasons given, rather than to drop earlier reasons in favor of newer ones. Learners with lower literacy skills revealed a greater tendency to add course-based reasons to earlier reasons for food choices in the discovery treatment; learners with higher literacy skills revealed a greater tendency to add course-based reasons to earlier reasons for food choices in the expository treatment.

Table 23 shows the results of analyses of interactions between literacy skills and expository-discovery treatments on measures of affective responses to instruction. Trends toward interaction were noted on measures of completeness of programmed lessons done in class (Lessons 1 and 3). Learners with lower literacy skills--when compared with learners with higher literacy skills--had relatively less complete lessons in the discovery treatment. Interactive trends were noted on two measures of a tendency to work alone or with others (Lesson 4 and a self-report). Learners with higher literacy skills showed a greater

tendency to work with others in the discovery treatment, whereas learners with lower literacy skills showed a greater tendency to work with others in the expository treatment.

The above data show the expository treatment to be relatively more productive for learners with lower literacy skills than for those with higher literacy skills on measures of (1) completeness and accuracy of programmed lessons, (2) a preference for working with others, and (3) a tendency to choose popular foods on posttests. In contrast, the data show the discovery treatment to be relatively more productive for learners with lower literacy skills than for those with higher literacy skills on measures of (1) unprompted recall of course information, (2) copying programmed feedback, (3) stability of responses to programmed items, (4) thoughtful (rather than wild) choices of foods, and (5) adding course-based reasons for food choices to earlier reasons given, rather than dropping earlier reasons in favor of newer ones. Thus the findings are mixed and somewhat contradictory. Hypothesis 6b--that the expository program condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills --is not supported.



Hypothesis 7

To test Hypothesis 7--that cultural attunements of PI are relatively more productive for traditional learners than for modern learners--two-way analyses of variance were computed for each dependent variable with levels of cultural attunement of PI (expository-discovery or individualized-group treatments) on one dimension and levels of modernity (determined by ranking intact groups according to means on an attitudinal modernity measure) on a second dimension.<sup>10</sup>

Hypothesis 7a.--Data related to Hypothesis 7a--that the group treatment (more culturally attuned) is relatively more productive for traditional learners than for modern learners--are shown in Tables 24, 25, and 26.

Table 24 shows the results of analyses of interactions between modernity and individualized-group treatments on measures of acquisition of content, transfer of training, and retention of learning. An interactive trend was noted on one measure of acquisition of content (Exercise 1). Less modern learners achieved higher scores in the group treatment, while more modern learners achieved

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<sup>10</sup> Groups were categorized as either "high modernity" or "low modernity" groups. High modernity groups were those whose mean scores on a modernity measure (Smith-Inkeles Minimum Scale of Individual Modernity, Short Forms 5 and 6) were higher than the over-all mean. Low modernity groups were those whose mean scores on the modernity measure were lower than the over-all mean. All groups were included in this analysis. Thus a total of sixteen cases (means for intact groups) were considered.

Table 24.--Analyses of Interactions Between Modernity and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Ind	Grp	Ind	Grp	
<u>Acquisition of Content</u>					
Exercise 1	6.96	6.30	6.07	7.46	2.93*
Exercise 2	6.72	6.20	6.53	6.34	.06
<u>Transfer of Training</u>					
Balance of Diet	4.42	2.67	2.63	3.98	2.91*
Variety of Diet	4.80	5.27	5.10	5.22	.11
Unprompted Recall	.54	.30	.63	.60	.33
<u>Retention of Learning</u>					
Balance of Diet	3.66	2.67	2.63	3.64	5.77**
Variety of Diet	4.00	4.27	3.77	3.98	.01
Unprompted Recall	.36	.37	.53	.62	.08

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

Table 25.--Analyses of Interactions Between Modernity and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Ind	Grp	Ind	Grp	
<u>Accuracy of Responses</u>					
Lesson 1	91.8	85.3	86.0	95.6	1.51*
Lesson 2	97.8	98.0	95.7	98.0	.99
Lesson 3	86.0	89.0	75.7	90.8	.64
Lesson 4	90.8	90.3	89.7	92.2	.13
<u>Copying Feedback</u>					
Lesson 1	.18	.41	.19	.14	1.34*
Lesson 2	.16	.58	.40	.43	1.30*
Lesson 3	.05	.14	.19	.17	.46
Lesson 4	.07	.41	.28	.26	1.06*
<u>Stability of Responses</u>					
Lesson 1	99.4	98.0	99.3	99.0	2.18*
Lesson 2	97.8	97.3	98.3	97.6	.03
Lesson 3	97.6	97.7	98.3	98.0	.28
Lesson 4	98.8	98.0	98.0	98.0	.29
<u>Time Required</u>					
Lesson 1	38.4	50.7	62.7	68.6	.05
Lesson 3	42.8	59.3	60.3	49.4	3.44*
<u>"Pop" Choices</u>					
Pretest	7.76	7.70	7.67	7.78	.07
Posttest	7.66	6.83	7.43	7.42	2.78*
Delayed Posttest	7.84	7.20	7.60	7.50	1.38*
<u>Shifting Focus</u>					
Pretest	6.34	6.47	7.03	6.58	.55
Posttest	5.12	5.43	5.30	4.94	.88
Delayed Posttest	5.28	5.33	4.97	4.94	.01
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.08	.20	.03	.11	.07
Posttest	.04	.20	.17	.15	1.19*
Delayed Posttest	.10	.12	.12	.19	.20
<u>1-2/3-4 Pattern</u>					
Pretest	.13	.14	.17	.16	.05
Posttest	.08	.26	.17	.21	1.22*
Delayed Posttest	.17	.23	.37	.18	3.64*
<u>Wild Choices</u>					
Pretest	1.46	1.47	1.67	1.32	1.12
Posttest	.66	1.20	1.30	.60	7.17**
Delayed Posttest	.52	1.13	1.60	.68	12.58***
<u>Added Course Reasons</u>					
Pretest to Posttest	1.90	1.93	1.77	1.84	.06
Pretest to Delayed Posttest	1.84	1.83	1.77	1.70	.07
Posttest to Delayed Posttest	1.64	1.77	1.80	1.88	.02

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 26.--Analyses of Interactions Between Modernity and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Ind	Grp	Ind	Grp	
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.76	.60	.57	.64	.47
Posttest	.72	.36	.47	.52	1.88*
Delayed Posttest	.70	.33	.40	.68	5.50**
<u>Choosing PI Instead of Story</u>	1.36	1.47	1.53	1.50	.54
<u>Conversations About Course</u>	1.20	1.07	1.33	1.32	1.31*
<u>Completeness of Programmed Lessons</u>					
Lesson 1	96.6	88.7	90.3	98.4	2.59*
Lesson 2	99.2	99.0	99.7	98.8	.60
Lesson 3	94.8	97.0	90.7	97.0	.43
Lesson 4	96.0	97.0	98.3	98.4	.09
<u>Working Alone vs. With Others</u>					
Lesson 1	.00	.27	.23	.58	.07
Lesson 2	.00	.00	.23	.24	.00
Lesson 3	.00	.17	.17	.32	.00
Lesson 4	.00	.00	.17	.26	.11
Self-Report	1.08	1.27	1.13	1.98	3.29*

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

higher scores in the individualized treatment. Interactions were noted on two measures of ability to plan a balanced diet. On the immediate posttest (transfer) measure, the interactive trend was not significant; on the delayed posttest (retention) measure, the interaction was significant at the .05 level. On both transfer and retention measures of ability to plan a balanced diet, less modern learners planned better balanced diets in the group treatment, while more modern learners planned better balanced diets in the individualized treatment.

Table 25 shows the results of analyses of interactions between modernity and individualized-group treatments on measures of strategies employed in learning. Interactive trends were noted on one measure of accuracy of responses to programmed items (Lesson 1), on three measures of a tendency to copy feedback (Lessons 1, 2, and 4), on one measure of stability of responses to programmed items (Lesson 1), on one measure of time required to complete programmed lessons (Lesson 3), on posttest and delayed posttest measures of popular choices of foods, on a posttest measure of unplanned (HI-HI-LO-LO Pattern) choices of foods, and on posttest and delayed posttest measures of mechanical (1-2/3-4 Pattern) choices of foods. Significant interactions ( $p < .01$  and  $p < .05$ ) were noted on posttest and delayed posttest measures of thoughtless (wild) choices of foods. In all of the above interactions, less modern learners achieved relatively more in the group treatment

and/or more modern learners achieved relatively more in the individualized treatment.

Table 26 shows the results of analyses of interactions between modernity and individualized-group treatments on measures of affective responses to instruction. Interactions were noted on two measures of pleasure reasons given for food choices. (On an immediate posttest measure, an interactive trend was noted; on a delayed posttest measure, the interaction was significant at the .05 level.) Less modern learners gave more pleasure reasons for food choices in the group treatment, while more modern learners gave more pleasure reasons for food choices in the individualized treatment. An interactive trend was noted on a measure of conversations about the course. More modern learners--when compared with less modern learners--reported relatively more conversations about the course in the individualized treatment than in the group treatment. An interactive trend was noted on one measure of completeness of programmed lessons (Lesson 1). Less modern learners had more complete lessons in the group treatment, while more modern learners had more complete lessons in the individualized treatment. An interactive trend was noted on a measure of a tendency to work alone or with others; less modern learners in the group treatment--when compared with more modern learners in the group treatment--reported working with others relatively more often.

The above data show the group treatment (more culturally attuned) to be relatively more productive for traditional learners than for modern learners. Hypothesis 7a is supported.

Hypothesis 7b.--Data related to Hypothesis 7b--that the expository program condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners--are shown in Tables 27, 28, and 29.

Table 27 shows the results of analyses of interactions between modernity and expository-discovery treatments on measures of acquisition of content, transfer of training, and retention of learning. Interactions were noted on both measures of acquisition of content (Exercises 1 and 2). A significant interaction ( $p < .05$ ) was noted on scores for Exercise 1, and a similar though non-significant trend was observed on scores for Exercise 2. More modern learners--when compared with less modern learners--achieved relatively higher scores in the expository treatment and relatively lower scores in the discovery treatment.

Table 28 shows the results of analyses of interactions between modernity and expository-discovery treatments on measures of strategies employed in learning. Interactions were noted on two measures of accuracy of responses to programmed items. On Lesson 1, an interactive trend was noted; on Lesson 4, a significant ( $p < .01$ )

Table 27.--Analyses of Interactions Between Modernity and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Exp	Dis	Exp	Dis	
<u>Acquisition of Content</u>					
Exercise 1	7.60	5.23	6.87	6.98	6.84**
Exercise 2	7.38	5.10	6.93	6.10	2.53*
<u>Transfer of Training</u>					
Balance of Diet	4.60	2.37	4.00	3.16	.61
Variety of Diet	4.70	5.43	5.07	5.24	.31
Unprompted Recall	.46	.43	.57	.64	.07
<u>Retention of Learning</u>					
Balance of Diet	3.44	3.03	3.50	3.12	.00
Variety of Diet	3.88	4.47	3.90	3.90	1.02
Unprompted Recall	.42	.27	.60	.58	.23

\*Trend, not statistically significant.

\*\*Significant at the .05 level.



Table 28.--Analyses of Interactions Between Modernity and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Exp	Dis	Exp	Dis	
<u>Accuracy of Responses</u>					
Lesson 1	98.0	75.0	99.7	87.4	1.44*
Lesson 2	98.8	96.3	98.3	96.4	.07
Lesson 3	96.2	72.0	97.7	77.6	.17
Lesson 4	97.0	80.0	96.7	88.0	8.81***
<u>Copying Feedback</u>					
Lesson 1	.41	.03	.42	.00	.15
Lesson 2	.30	.35	.55	.34	.54
Lesson 3	.07	.11	.13	.21	.07
Lesson 4	.32	.00	.69	.02	2.44*
<u>Stability of Responses</u>					
Lesson 1	98.6	99.3	99.0	99.2	.37
Lesson 2	97.6	97.7	98.7	97.4	.92
Lesson 3	97.4	98.0	97.7	98.4	.04
Lesson 4	98.0	99.3	98.0	98.0	.88
<u>Time Required</u>					
Lesson 1	30.8	63.3	44.0	79.8	.03
Lesson 3	42.6	59.7	43.7	59.4	.01
<u>"Pop" Choices</u>					
Pretest	7.62	7.93	7.50	7.88	.01
Posttest	7.32	7.40	7.53	7.36	.19
Delayed Posttest	7.50	7.77	7.23	7.72	.21
<u>Shifting Focus</u>					
Pretest	6.42	6.33	6.37	6.98	.84
Posttest	5.34	5.07	4.87	5.20	.70
Delayed Posttest	5.34	5.23	4.80	5.04	.24
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.07	.21	.17	.02	6.04**
Posttest	.05	.17	.05	.22	.11
Delayed Posttest	.13	.07	.15	.17	.40
<u>1-2/3-4 Pattern</u>					
Pretest	.14	.11	.12	.19	1.08
Posttest	.13	.18	.22	.18	.42
Delayed Posttest	.14	.28	.24	.25	.80
<u>Wild Choices</u>					
Pretest	1.44	1.50	1.33	1.52	.13
Posttest	.62	1.27	.97	.80	2.45*
Delayed Posttest	.54	1.10	.97	1.06	.65
<u>Added Course Reasons</u>					
Pretest to Posttest	1.96	1.83	1.67	1.90	7.10**
Pretest to Delayed Posttest	1.86	1.80	1.67	1.76	.48
Posttest to Delayed Posttest	1.56	1.90	1.70	1.94	.12

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 29.--Analyses of Interactions Between Modernity and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Modernity		Low Modernity		F-ratio
	Exp	Dis	Exp	Dis	
<hr/>					
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.70	.70	.63	.60	.01
Posttest	.54	.67	.47	.52	.05
Delayed Posttest	.54	.60	.70	.50	.65
<u>Choosing PI Instead of Story</u>	1.38	1.43	1.40	1.58	.50
<u>Conversations About Course</u>	1.30	.90	1.10	1.34	8.06*
<u>Completeness of Programmed Lessons</u>					
Lesson 1	99.4	84.0	99.7	92.8	1.00
Lesson 2	99.4	98.7	99.7	98.8	.03
Lesson 3	99.0	90.0	98.7	92.2	.24
Lesson 4	99.0	92.0	98.7	98.2	27.5**
<u>Working Alone vs. With Others</u>					
Lesson 1	.16	.00	.60	.36	.06
Lesson 2	.00	.00	.23	.24	.00
Lesson 3	.04	.10	.33	.22	.42
Lesson 4	.00	.00	.33	.16	.38
Self-Report	1.16	1.13	1.53	1.74	.22
<u>Attendance</u>	77.7	81.4	78.3	78.2	.10

\*Significant at the .05 level.

\*\*Significant at the .01 level.

interaction was observed. Less modern learners--when compared with more modern learners--made relatively more accurate responses to programmed items in the discovery treatment. An interactive trend was noted on a measure of the tendency to copy feedback (Lesson 4). Less modern learners--when compared with more modern learners--showed a greater tendency to copy feedback in expository lessons. An interactive trend was noted on a posttest measure of thoughtless (wild) choices of food. Less modern learners made fewer thoughtless choices of foods in the discovery treatment, while more modern learners made fewer thoughtless choices of foods in the expository treatment. A significant ( $p < .05$ ) interaction was noted on a pretest to posttest measure of a tendency to add course-based reasons for food choices to earlier reasons given, rather than to drop earlier reasons in favor of newer ones. Less modern learners showed a greater tendency to add course-based reasons to earlier reasons given for food choices in the discovery treatment; more modern learners showed a greater tendency to add course-based reasons for food choices to earlier reasons given for food choices in the expository treatment.

Table 29 shows the results of analyses of interactions between modernity and expository-discovery treatments on measures of affective responses to instruction. A significant ( $p < .05$ ) interaction was noted on a self-report of conversations about the course. Less modern

learners reported more conversations about the course in the discovery treatment, while more modern learners reported more conversations about the course in the expository treatment. A significant ( $p < .01$ ) interaction was noted on a measure of the completeness of programmed lessons (Lesson 4). Less modern learners--when compared with more modern learners--had relatively more complete lessons in the discovery treatment.

The above data do not support Hypothesis 7b, that the expository treatment is relatively more productive for traditional learners than for modern learners. To the contrary, the data support the alternate hypothesis, that the discovery treatment is relatively more productive for traditional learners than for modern learners.

### Hypothesis 8

To test Hypothesis 8--that cultural attunements of PI are relatively more productive for learners who are less motivated than for those who are more motivated--two-way analyses of variance were computed for all dependent variables with levels of cultural attunement of PI (expository-discovery or individualized-group treatments) on one dimension and levels of motivation (determined by ranking intact groups on a measure of community participation) on a second dimension.<sup>11</sup>

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<sup>11</sup>Church attendance was the measure of community participation used. Each group was ranked according to the

Hypothesis 8a.--Data related to Hypothesis 8a--that the group treatment (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners--are shown in Tables 30, 31, and 32.

Table 30 shows the results of analyses of interactions between motivation and individualized-group treatments on measures of acquisition of content, transfer of training, and retention of learning. No significant interactions or meaningful interactive trends were noted.

Table 31 shows the results of analyses of interactions between motivation and individualized-group treatments on measures of strategies employed in learning. An interactive trend was noted on one measure of accuracy of responses to programmed lessons (Lesson 1). More motivated learners responded more accurately in the group treatment, while less motivated learners responded more accurately in the individualized treatment. A significant interaction ( $p < .05$ ) was noted on a tendency to copy feedback on the first home assignment (Lesson 2). Less motivated learners copied more feedback in the group treatment, while more motivated learners copied more

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mean of answers given to the question "How often do you attend church?" Groups reporting a rate of church attendance which was above the median for all groups were ranked "high" in community participation; groups reporting a rate of church attendance which was below the median for all groups were ranked "low" in community participation. All groups were included in this analysis. Thus a total of sixteen cases (means for intact groups) were considered.

Table 30.--Analyses of Interactions Between Motivation and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Ind	Grp	Ind	Grp	
<u>Acquisition of Content</u>					
Exercise 1	6.88	7.80	6.38	6.25	.84
Exercise 2	7.23	6.43	6.08	6.15	.54
<u>Transfer of Training</u>					
Balance of Diet	4.23	4.03	3.28	2.95	.00
Variety of Diet	5.20	5.15	4.63	5.33	.59
Unprompted Recall	.73	.45	.43	.53	1.15
<u>Retention of Learning</u>					
Balance of Diet	3.60	3.18	2.95	3.38	.82
Variety of Diet	3.88	3.98	3.95	4.20	.06
Unprompted Recall	.53	.53	.33	.53	.48

Table 31.--Analyses of Interactions Between Motivation and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Ind	Grp	Ind	Grp	
<u>Accuracy of Responses</u>					
Lesson 1	88.0	98.0	91.3	85.5	1.61*
Lesson 2	96.5	98.5	97.5	97.5	.86
Lesson 3	80.0	92.0	84.3	88.3	.28
Lesson 4	91.5	93.8	89.3	89.3	.08
<u>Copying Feedback</u>					
Lesson 1	.15	.18	.23	.30	.03
Lesson 2	.22	.16	.28	.82	8.05**
Lesson 3	.16	.13	.05	.19	1.07
Lesson 4	.11	.22	.19	.42	.13
<u>Stability of Responses</u>					
Lesson 1	99.0	99.0	99.8	98.3	4.91**
Lesson 2	98.0	97.5	98.0	97.5	.00
Lesson 3	97.8	98.0	98.0	97.8	.40
Lesson 4	98.3	98.5	98.8	97.5	1.15*
<u>Time Required</u>					
Lesson 1	51.3	50.5	43.8	73.3	1.22*
Lesson 3	52.8	47.3	46.0	59.0	1.43*
<u>"Pop" Choices</u>					
Pretest	7.48	7.73	7.98	7.78	.57
Posttest	7.48	7.38	7.68	7.03	1.17*
Delayed Posttest	7.58	7.60	7.93	7.18	3.53*
<u>Shifting Focus</u>					
Pretest	7.15	6.56	6.05	6.53	2.60
Posttest	4.98	4.93	5.40	5.33	.00
Delayed Posttest	4.75	4.83	5.58	5.35	.25
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.04	.13	.08	.16	.00
Posttest	.13	.19	.05	.16	.08
Delayed Posttest	.14	.20	.07	.14	.01
<u>1-2/3-4 Pattern</u>					
Pretest	.21	.14	.08	.16	3.28
Posttest	.11	.18	.12	.27	.33
Delayed Posttest	.32	.14	.17	.26	4.80**
<u>Wild Choices</u>					
Pretest	1.38	1.30	1.70	1.45	.33
Posttest	.13	.65	1.08	1.03	.01
Delayed Posttest	.83	.85	1.03	.85	.10
<u>Added Course Reasons</u>					
Pretest to Posttest	1.95	1.88	1.75	1.88	1.63*
Pretest to Delayed Posttest	1.90	1.83	1.73	1.68	.01
Posttest to Delayed Posttest	1.85	1.95	1.55	1.73	.07

\*Trend, not statistically significant.  
 \*\*Significant at the .05 level.

Table 32.--Analyses of Interactions Between Motivation and Individualized (Ind) and Group (Grp) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Ind	Grp	Ind	Grp	
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.50	.63	.88	.63	1.56*
Posttest	.35	.60	.90	.33	20.5**
Delayed Posttest	.43	.63	.75	.48	2.73*
<u>Choosing PI Instead of Story</u>	1.48	1.60	1.38	1.38	.55
<u>Conversations About Course</u>	1.28	1.40	1.08	1.05	.39
<u>Completeness of Programmed Lessons</u>					
Lesson 1	92.5	99.3	96.0	90.3	1.59*
Lesson 2	99.5	99.5	99.3	98.3	2.18*
Lesson 3	92.5	97.5	94.0	96.5	.16
Lesson 4	98.3	99.0	95.5	96.8	.03
<u>Working Alone vs. With Others</u>					
Lesson 1	.13	.55	.05	.38	.09
Lesson 2	.18	.08	.00	.23	2.25*
Lesson 3	.13	.25	.00	.28	.34
Lesson 4	.13	.08	.00	.25	1.07
Self-Report	1.15	2.00	1.05	1.43	1.53*

\*Trend, not statistically significant.

\*\*Significant at the .01 level.



feedback in the individualized treatment. Interactions were noted on two measures of the stability of responses to programmed items (Lesson 1 and Lesson 4). The interaction observed in Lesson 1 was significant at the .05 level; the interaction in Lesson 4 was a non-significant trend in the same direction. Less motivated learners--when compared with more motivated learners--gave relatively more stable responses in the individualized treatment, and relatively less stable responses in the group treatment. Interactive trends were noted on both measures of time required to complete programmed lessons (Lessons 1 and 3). Less motivated learners required relatively more time to complete the lessons in the group treatment, while more motivated learners required relatively more time to complete the lessons in the individualized treatment. Interactive trends were noted on both posttest and delayed posttest measures of choices of popular foods ("pop" choices). On both measures, less motivated learners made relatively more choices of popular foods in the individualized treatment, and relatively fewer choices of popular foods in the group treatment. A significant interaction ( $p < .05$ ) was noted on a delayed posttest measure of a tendency to make mechanical (1-2/3-4 Pattern) responses. Less motivated learners made fewer mechanical responses in the individualized treatment, while more motivated learners made fewer mechanical responses in the group treatment. An interactive trend was noted on a pretest to posttest

measure of a tendency to add course-based reasons for food choices to earlier reasons given, rather than to drop earlier reasons in favor of newer ones. Less motivated learners showed less tendency to add course-based reasons to earlier reasons given in the individualized treatment; more motivated learners showed a greater tendency to add course-based reasons to earlier reasons given in the individualized treatment.

Table 32 shows the results of analyses of interactions between motivation and individualized-group treatments on measures of affective responses to instruction. Interactions were noted on all three measures of pleasure reasons given for food choices. On the immediate posttest, the interaction was significant at the .01 level. On the pretest and delayed posttest measures, responses revealed interactive trends in the same direction. Less motivated learners gave fewer pleasure reasons for food choices in the group treatment, while more motivated learners gave fewer pleasure reasons for food choices in the individualized treatment. Interactive trends were noted on two measures of completeness of programmed lessons (Lessons 1 and 2). Less motivated learners had relatively more complete lessons in the individualized treatment, while more motivated learners had relatively more complete lessons in the group treatment. Trends toward interaction were noted on two measures of a tendency to work alone or with others (Lesson 2 and a Self-Report). In the group

treatment, more motivated learners were observed to work alone relatively more on home assignments, but at the same time to report working together relatively more than less motivated learners.

The above data fail to support Hypothesis 8a, that the group treatment is relatively more productive for less motivated learners. Several measures of strategies employed in learning and affective responses to instruction tend to support an alternate hypothesis that the group treatment is relatively more productive for more motivated learners.

Hypothesis 8b.--Data related to Hypothesis 8b--that the expository program condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners--are shown in Tables 33, 34, and 35.

Table 33 shows the results of analyses of interactions between motivation and expository-discovery treatments on measures of acquisition of content, transfer of training, and retention of learning. Significant interactions ( $p < .01$  and  $p < .05$ ) were noted on both immediate posttest (transfer) and delayed posttest (retention) measures of ability to plan a varied diet. Less motivated learners planned more varied diets in the discovery treatment, while more motivated learners planned more varied diets in the expository treatment. An interactive trend was noted on a delayed posttest (retention)

Table 33.--Analyses of Interactions Between Motivation and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Acquisition of Content, Transfer of Training, and Retention of Learning.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Exp	Dis	Exp	Dis	
<u>Acquisition of Content</u>					
Exercise 1	7.75	6.93	6.90	5.73	.12
Exercise 2	7.70	5.95	6.73	5.50	.36
<u>Transfer of Training</u>					
Balance of Diet	5.13	3.13	3.63	2.60	.35
Variety of Diet	5.38	4.98	4.30	5.65	4.33**
Unprompted Recall	.65	.53	.35	.60	1.13
<u>Retention of Learning</u>					
Balance of Diet	3.88	2.90	3.05	3.28	1.85*
Variety of Diet	4.18	3.68	3.60	4.55	11.40***
Unprompted Diet	.58	.48	.40	.45	.25

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 34.--Analyses of Interactions Between Motivation and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Strategies Employed in Learning.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Exp	Dis	Exp	Dis	
<u>Accuracy of Responses</u>					
Lesson 1	98.0	88.0	99.3	77.5	1.71*
Lesson 2	98.5	96.5	98.8	96.3	.07
Lesson 3	95.5	76.5	98.0	74.5	.20
Lesson 4	96.5	88.8	97.3	81.3	8.57***
<u>Copying Feedback</u>					
Lesson 1	.33	.00	.51	.03	2.86*
Lesson 2	.18	.20	.61	.49	.24
Lesson 3	.06	.23	.13	.11	1.62*
Lesson 4	.31	.02	.61	.00	1.90*
<u>Stability of Responses</u>					
Lesson 1	98.8	99.3	98.8	99.3	.00
Lesson 2	98.3	97.3	97.8	97.8	.52
Lesson 3	97.3	98.5	97.8	98.0	2.67*
Lesson 4	99.0	97.8	97.0	99.3	10.90***
<u>Time Required</u>					
Lesson 1	35.0	66.8	36.5	80.5	.37
Lesson 3	41.0	59.0	45.0	60.0	.05
<u>"Pop" Choices</u>					
Pretest	7.40	7.80	7.75	8.00	.07
Posttest	7.30	7.55	7.50	7.20	.99
Delayed Posttest	7.33	7.85	7.48	7.63	.66
<u>Shifting Focus</u>					
Pretest	6.65	7.05	6.15	6.43	.03
Posttest	4.70	5.20	5.63	5.10	2.74*
Delayed Posttest	4.68	4.90	5.60	5.33	.71
<u>HI-HI-LO-LO Pattern</u>					
Pretest	.17	.00	.05	.18	8.24***
Posttest	.06	.25	.05	.16	.30
Delayed Posttest	.19	.15	.10	.11	.15
<u>1-2/3-4 Pattern</u>					
Pretest	.17	.18	.10	.14	.04
Posttest	.15	.14	.17	.22	.17
Delayed Posttest	.19	.26	.17	.27	.05
<u>Wild Choices</u>					
Pretest	1.13	1.55	1.68	1.48	5.77**
Posttest	.43	.93	1.08	1.03	1.29*
Delayed Posttest	.40	1.28	1.00	.88	3.88*
<u>Added Course Reasons</u>					
Pretest to Posttest	1.88	1.95	1.83	1.80	.37
Pretest to Delayed Posttest	1.90	1.83	1.68	1.73	.37
Posttest to Delayed Posttest	1.83	1.98	1.40	1.88	2.18*

\*Trend, not statistically significant.

\*\*Significant at the .05 level.

\*\*\*Significant at the .01 level.

Table 35.--Analyses of Interactions Between Motivation and Expository (Exp) and Discovery (Dis) Treatments for Group Means on Measures of Affective Responses to Instruction.

Measures of Learning	High Motivation		Low Motivation		F-ratio
	Exp	Dis	Exp	Dis	
<u>Pleasure Reasons for Food Choices</u>					
Pretest	.58	.55	.78	.73	.01
Posttest	.40	.55	.63	.60	.32
Delayed Posttest	.53	.53	.68	.55	.16
<u>Choosing PI Instead of Story</u>	1.43	1.65	1.35	1.40	1.37*
<u>Conversations About Course</u>	1.33	1.35	1.13	1.00	.39
<u>Completeness of Programmed Lessons</u>					
Lesson 1	99.5	92.3	99.5	86.8	.40
Lesson 2	99.8	99.3	99.3	98.3	.60
Lesson 3	98.5	91.5	99.3	91.3	.04
Lesson 4	98.5	98.8	99.3	93.0	22.50**
<u>Working Alone vs. With Others</u>					
Lesson 1	.30	.38	.35	.08	.86
Lesson 2	.00	.25	.18	.05	3.20*
Lesson 3	.10	.28	.20	.08	1.21*
Lesson 4	.00	.20	.25	.00	2.61*
Self-Report	1.33	1.83	1.28	1.20	1.33*

\*Trend, not statistically significant.

\*\*Significant at the .01 level.

measure of ability to plan a balanced diet. Less motivated learners planned better balanced diets in the discovery treatment, while more motivated learners planned better balanced diets in the expository treatment.

Table 34 shows the results of analyses of interactions between motivation and expository-discovery treatments on measures of strategies employed in learning. Interactions were noted on two measures of accuracy of responses to programmed items. An interactive trend was noted in Lesson 1; a significant ( $p < .01$ ) interaction was noted in Lesson 4. On both measures, less motivated learners--when compared with more motivated learners--made relatively more accurate responses in the expository treatment, and relatively less accurate responses in the discovery treatment. Interactive trends were noted in three measures of a tendency to copy feedback (Lessons 1, 3, and 4). Less motivated learners--when compared with more motivated learners--showed a relatively greater tendency to copy feedback in expository lessons. Interactions were noted on two measures of stability of responses to programmed items (Lesson 3 and Lesson 4). An interactive trend was noted in Lesson 3; a significant ( $p < .01$ ) interaction was noted in Lesson 4. In Lesson 3, completed in class, more motivated learners--when compared with less motivated learners--showed relatively more stable answers in the discovery treatment, and relatively less stable answers in the expository treatment. In Lesson 4, completed

at home, less motivated learners made more stable responses in the discovery treatment, while more motivated learners made more stable responses in the expository treatment. An interactive trend was noted on a posttest measure of a tendency to shift focus of attention among food groups. Less motivated learners shifted their focus of attention more often in the expository treatment, while more motivated learners shifted their focus of attention more often in the discovery treatment. A significant interaction ( $p < .05$ ) was noted on a pretest measure of thoughtless (wild) choices of foods; interactive trends in the same direction were noted on posttest and delayed posttest measures of thoughtless (wild) choices. Less motivated learners made more thoughtful choices in the discovery treatment, while more motivated learners made more thoughtful choices in the expository treatment. An interactive trend was noted on a posttest to delayed posttest measure of a tendency to add course-based reasons for food choices to earlier reasons given rather than to drop earlier reasons in favor of newer ones. Less motivated learners--when compared with more motivated learners--showed relatively less tendency to add course-based reasons to earlier reasons in the expository treatment.

Table 35 shows the results of analyses of interactions between motivation and expository-discovery treatments on measures of affective responses to instruction.



An interactive trend was noted on a measure of a tendency to chose PI instead of a story. More motivated learners--when compared with less motivated learners--showed a relatively greater tendency to chose PI in the discovery treatment. A significant ( $p < .01$ ) interaction was noted on a measure of completeness of programmed lessons (Lesson 4). Less motivated learners--when compared with more motivated learners--had relatively more complete lessons in the expository treatment, and relatively less complete lessons in the discovery treatment. Interactive trends were noted on four out of five measures of a tendency to work alone or with others. Less motivated learners worked alone more often in the discovery treatment, while more motivated learners worked alone more often in the expository treatment.

The above data reveal mixed findings. The expository method was found to be more productive for less motivated learners on measures of (1) accuracy and completeness of programmed lessons, (2) stability of responses to programmed items (in class), (3) a tendency to choose PI instead of a story, and (4) a tendency to work with others. In contrast, the discovery method was found to be more productive for less motivated learners on measures of (1) ability to plan a balanced and varied diet; (2) a tendency to copy less feedback; (3) a tendency to make more stable responses (at home); and (4) a tendency to shift focus of attention among food groups less often; (5) a tendency to

make fewer thoughtless (wild) choices of foods, and (6) a tendency to add course-based reasons for food choices to earlier reasons given, rather than to drop earlier reasons in favor of newer ones. Hypothesis 8b--that the expository program condition is relatively more productive for less motivated learners than for more motivated learners--is only partially supported. Some data lend support to the alternate hypothesis (that the discovery program condition is relatively more productive for less motivated learners).

### Summary

Findings which have been reported in this chapter are summarized in Figures 6 through 17. A summary of findings related to Hypothesis 1--that learning occurs through PI in a Brazilian milieu--is shown in Figure 6. Analyses of selected measures supported the hypothesis.

A summary of findings related to Hypothesis 2a--that the group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned)--is shown in Figure 7. The hypothesis was not supported. The findings were contradictory, and not statistically significant.

A summary of findings related to Hypothesis 2b--that the expository program condition (more culturally attuned) is more effective than the discovery program condition (less culturally attuned)--is shown in Figure 8. The hypothesis was partially supported. Findings must be

Hypothesis Tested	Findings Which Support Hypothesis	Findings Which Support Alternate Hypothesis	Generalization
Learning occurs through PI in a Brazilian milieu	Posttests > Pretest: Balance of Diet (5) Unprompted Recall (5) Shifting Focus (5) Wild Choices (5)	None	Analyses of selected findings support hypothesis

Figure 6.--Summary of Findings Related to Hypothesis 1.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure;  
    similar trend on at least one other measure
- (5) Statistically significant on more than one measure

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned)	<p>G &gt; I:</p> <p>Exercise 1 Accuracy of Responses Working With Others</p>	<p>I &gt; G:</p> <p>Exercise 2 Copying Feedback Stability of Responses Time Required HI-HI-LO-LO Pattern</p>	<p>Hypothesis is not supported</p> <p>Findings contradictory, not statistically significant</p>

Figure 7.--Summary of Findings Related to Hypothesis 2a.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure;  
similar trend on at least one other measure
- (5) Statistically significant on more than one measure

I Individualized interaction  
G Group interaction

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The expository program condition (more culturally attuned) is more effective than the discovery program condition (less culturally attuned)	<p>E &gt; D:</p> <p>Exercises 1 and 2</p> <p>Balance of Diet (overall achievement)</p> <p>Accuracy of Responses</p> <p>Time Required</p> <p>HI-HI-LO-LO Pattern (immediate posttest)</p> <p>Completeness of Programmed Lessons</p>	<p>D &gt; E:</p> <p>Balance of Diet (gains in retention)</p> <p>Copying Feedback</p> <p>HI-HI-LO-LO Pattern (delayed posttest)</p> <p>Added Course Reasons</p> <p>Choosing PI Instead of Story</p>	<p>Hypothesis is partially supported</p> <p>Findings must be interpreted in the light of trends and interactions which tend to support alternate hypothesis</p>
	(5)	(1)	(1)
	(2)	(5)	(5)
	(5)	(1)	(1)
	(5)	(1)	(1)
	(1)	(1)	(1)
	(5)	(1)	(1)

Figure 8.--Summary of Findings Related to Hypothesis 2b.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

E Expository program condition  
D Discovery program condition

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning	HI LIT > LO LIT: Exercise 1 (3) Exercise 2 (3) Balance of Diet (5) Accuracy of Responses (5) Copying Feedback (5) Stability of Responses (5) Time Required (5) "Pop" Choices (5) Shifting Focus (3) HI-HI-LO-LO Pattern (3) 1-2/3-4 Pattern (3) Wild Choices (5) Added Course Reasons (5) Pleasure Reasons for Food Choices (3) Completeness of Programmed Lessons (5)	LO LIT > HI LIT: Variety of Diet (5) Choosing PI Instead of Story (3) Working Alone (5)	Hypothesis is supported

Figure 9.---Summary of Findings Related to Hypothesis 3.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure;  
similar trend on at least one other measure
- (5) Statistically significant on more than one measure

HI LIT High Literacy Skills  
 LO LIT Low Literacy Skills

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning	<p>HI MOD &gt; LO MOD:</p> <p>Balance of Diet (3)</p> <p>Variety of Diet (3)</p> <p>Copying Feedback (3)</p> <p>HI-HI-LO-LO Pattern (5)</p> <p>1-2/3-4 Pattern (5)</p> <p>Added Course Reasons (on measures of urbanity, proximity of previous residence to São Paulo, stability of present residence in São Paulo, higher occupational status) (5)</p> <p>Pleasure Reasons for Food Choices (3)</p> <p>Conversations about Course (5)</p> <p>Working with Others (on measures of proximity of previous residence to São Paulo, stability of residence in São Paulo, higher occupational status) (5)</p>	<p>LO MOD &gt; HI MOD:</p> <p>Unprompted Recall Time Required (3)</p> <p>"Pop" Choices (5)</p> <p>Added Course Reasons (on measures of modern school experience and attitude and attitudinal modernity) (5)</p> <p>Completeness of Lessons Working with Others (on measures of modern school experience and attitudinal modernity) (5)</p>	<p>Hypothesis is partially supported</p> <p>The evidence is scattered, and not always in the direction hypothesized</p>

Figure 10.--Summary of Findings Related to Hypothesis 4.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure;  
similar trend on at least one other measure
- (5) Statistically significant on more than one measure

HI MOD High Modernity  
LO MOD Low Modernity

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
Motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning	<p>HI MOT &gt; LO MOT:</p> <p>Exercise 1 com (3)</p> <p>Exercise 2 com (3)</p> <p>Balance of Diet sex (3)</p> <p>Variety of Diet age (3)</p> <p>Unprompted Recall age (3)</p> <p>Copying Feedback sex (3)</p> <p>1-2/3-4 Pattern com (5)</p> <p>Wild Choices sex (3)</p> <p>Added Course sex (5)</p> <p>Reasons age (5)</p> <p>Conversations about sex (5)</p> <p>Course age (5)</p> <p>Working With Others sex (5)</p> <p>age com (5)</p>	<p>LO MOT &gt; HI MOT:</p> <p>Accuracy of Responses age (3)</p> <p>Stability of Responses age com (5)</p> <p>Time Required age (3)</p> <p>Shifting Focus age (3)</p> <p>HI-HI-LO-LO Pattern age (3)</p>	<p>Hypothesis has limited but consistent support on measures of female sex and community participation</p> <p>Mixed and inconclusive findings fail to support hypothesis on measures of age</p>

Figure 11.--Summary of Findings Related to Hypothesis 5.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

HI MOT High Motivation  
 LO MOT Low Motivation  
 COM Community Participation



<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The group interaction condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills	G > I: Balance of Diet (3) Accuracy of Responses (1) Wild Choices (3) Completeness of Programmed Lessons (in class) (1)	I > G: Copying Feedback (3) Stability of Responses (3) Shifting Focus (1) Choosing PI instead of Story (3) Completeness of Programmed Lessons (at home) (3) Working with Others (1)	Hypothesis is only partially supported Evidence is contradictory and inconclusive.

Figure 12.--Summary of Findings Related to Hypothesis 6a.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

I Individualized interaction  
G Group interaction

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The expository program condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills	E > D: Accuracy of Responses (5) "Pop" Choices (1) Completeness of Programmed Lessons (2) Working with Others (2)	D > E: Unprompted Recall (1) Copying Feedback (5) Stability of Responses (2) Wild Choices (2) Added Course Reasons (3)	Hypothesis is not supported Findings are mixed and somewhat contradictory

Figure 13.--Summary of Findings Related to Hypothesis 6b.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure;  
similar trend on at least one other measure
- (5) Statistically significant on more than one measure

E Expository program condition  
D Discovery program condition

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The group interaction condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners	G > I: Exercise 1 (1) Balance of Diet (4) Accuracy of Responses (1) Copying Feedback (2) Stability of Responses (1) Time Required (1) "Pop" Choices (2) HI-HI-LO-LO Pattern (1) 1-2/3-4 Pattern (2) Wild Choices (5) Pleasure Reasons (4) Conversations about Course (1) Completeness of Programmed Lessons (1) Working with Others (1)	None	Hypothesis is supported

Figure 14.--Summary of Findings Related to Hypothesis 7a.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

I Individualized interaction  
G Group interaction

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The expository program condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners	None	<p>D &gt; E:</p> <p>Exercise 1 (3)</p> <p>Exercise 2 (1)</p> <p>Accuracy of Responses (4)</p> <p>Copying Feedback (1)</p> <p>Wild Choices (1)</p> <p>Added Course Reasons (3)</p> <p>Conversations about Course (3)</p> <p>Completeness of Programmed Lessons (3)</p>	<p>Hypothesis is not supported</p> <p>Scattered but consistent evidence supports alternate hypothesis</p>

Figure 15.--Summary of Findings Related to Hypothesis 7b.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

E Expository program condition  
D Discovery program condition

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The group interaction condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners	<p>G &gt; I:</p> <p>Added Course Reasons Working with Others (observed) (1)</p>	<p>I &gt; G:</p> <p>Accuracy of Responses Copying Feedback Stability of Responses Time Required "Pop" Choices 1-2/3-4 Pattern Pleasure Reasons for Food Choices Completeness of Programmed Lessons Working with Others (reported) (1)</p>	<p>Hypothesis is not supported</p> <p>Several measures of strategies and affective responses support alternate hypothesis</p> <p>(1) (3) (4) (2) (2) (3) (4) (2) (1)</p>

Figure 16.--Summary of Findings Related to Hypothesis 8a.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

I Individualized interaction  
G Group interaction

<u>Hypothesis Tested</u>	<u>Findings Which Support Hypothesis</u>	<u>Findings Which Support Alternate Hypothesis</u>	<u>Generalization</u>
The expository program condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners	<p>E &gt; D:</p> <p>Accuracy of Responses (4)</p> <p>Stability of Responses (1)</p> <p>Choosing PI (1)</p> <p>Completeness of Programmed Lessons (3)</p> <p>Working with Others (2)</p>	<p>D &gt; E:</p> <p>Variety of Diet (5)</p> <p>Balance of Diet (1)</p> <p>Copying Feedback (2)</p> <p>Stability of Responses (at home) (3)</p> <p>Shifting Focus (1)</p> <p>Wild Choices (2)</p> <p>Added Course Reasons (1)</p>	<p>Hypothesis is partially supported</p> <p>Some evidence supports the alternate hypothesis</p>

Figure 17.--Summary of Findings Related to Hypothesis 8b.

Key:

- (1) Trend on one measure
- (2) Trend on more than one measure
- (3) Statistically significant on one measure
- (4) Statistically significant on one measure; similar trend on at least one other measure
- (5) Statistically significant on more than one measure

E Expository program condition  
D Discovery program condition

interpreted in the light of interactions and trends which tend to support the alternate hypothesis.

A summary of findings related to Hypothesis 3--that the literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning--is shown in Figure 9. The hypothesis was supported.

A summary of findings related to Hypothesis 4--that the modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning--is shown in Figure 10. The hypothesis was partially supported. The evidence was scattered, and not always in the direction hypothesized.

A summary of findings related to Hypothesis 5--that motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning--is shown in Figure 11. The hypothesis had limited but consistent support on measures of female sex and community participation. Mixed and inconclusive findings failed to support the hypothesis on measures of age.

A summary of findings related to Hypothesis 6a--that the group interaction condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills--is shown in Figure 12. The hypothesis was only partially supported. The evidence was contradictory and inconclusive.

A summary of findings relative to Hypothesis 6b-- that the expository program condition (more productive for learners with lower literacy skills than for those with higher literacy skills--is shown in Figure 13. The hypothesis was not supported. The findings were mixed and somewhat contradictory.

A summary of findings related to Hypothesis 7a-- that the group interaction condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners--is shown in Figure 14. The hypothesis was supported.

A summary of findings related to Hypothesis 7b-- that the expository program condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners--is shown in Figure 15. The hypothesis was not supported. Scattered but consistent evidence supported the alternate hypothesis.

A summary of findings related to Hypothesis 8a-- that the group interaction condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners--is shown in Figure 16. The hypothesis was not supported. Several measures of strategies and affective responses supported the alternate hypothesis.

A summary of findings related to Hypothesis 8b-- that the expository program condition (more culturally attuned) is relatively more productive for less motivated



learners than for more motivated learners--is shown in Figure 17. The hypothesis was partially supported, with some of the evidence supporting the alternate hypothesis.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

In this final chapter of the dissertation, a summary of the investigation and a discussion of research findings and observations are provided. From the discussion, conclusions are drawn and implications for teaching and further research are suggested.

#### Summary of the Investigation

The present research has explored a series of questions arising from attempts to attune programmed instruction (PI) to a Brazilian milieu: (1) whether or not learning occurs through PI; (2) whether or not increases in cultural attunement of PI along two dimensions (instructional interaction and program style) facilitate learning; (3) whether or not the nature of the learners affects the degree to which PI facilitates learning; and (4) whether or not certain dominant characteristics of the learners affect the degree to which cultural attunements of PI facilitate learning.

The research subjects were 145 youths and adults (ages 14-75) who reside in the metropolitan area of São Paulo, Brazil. They were voluntary participants in a three-session programmed course on nutrition given at sixteen testing sites throughout Greater São Paulo. The mean years of schooling for these subjects was 3.7 years. Eighty-three per cent of them were employed in manual occupations with low social status.

Two versions of a programmed unit were developed for this research. The versions were varied systematically along three dimensions of expository-discovery teaching described by Shulman (1970): (1) the degree of guidance provided, (2) the rule or egrule sequencing of instruction, and (3) the didactic or Socratic style of instruction.

In addition, instruments were adopted, adapted, or developed to provide measures of learner characteristics and measures of learning. Learner characteristics (independent variables) examined in this research included literacy skills, modernity, and motivation to learn. Measures of learning (dependent variables) included content acquisition, transfer of training, retention of learning, strategies employed in learning, and affective responses to instruction.

The research plan called for a 2 x 2 factorial design with variations of instructional interaction (individualized and group conditions) on one dimension,

and variations of program style (expository and discovery conditions) on the other dimension.

Data were gathered through three visits to each of sixteen test sites, and examined through analyses of variance and simple and partial correlational procedures.

Tests of hypotheses resulted in the following findings:

Hypothesis 1--that learning occurs through PI in a Brazilian milieu--was supported.

Hypothesis 2a--that the group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned)--was not supported. The findings were contradictory, and not statistically significant.

Hypothesis 2b--that the expository program condition (more culturally attuned) is more effective than the discovery program condition (less culturally attuned)--was partially supported. The findings must be interpreted in the light of interactions which tend to support the alternate hypothesis that the discovery program condition is more effective.

Hypothesis 3--that the literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning--was supported.

Hypothesis 4--that the modernity of learners affects the degree to which PI (under all treatment

conditions) facilitates learning--was partially supported. The evidence was scattered, and not always in the direction hypothesized.

Hypothesis 5--that motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning--had limited but consistent support on measures of sex and community participation. Mixed and inconclusive findings failed to support the hypothesis on measures of age.

Hypothesis 6a--that the group interaction condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills--was only partially supported. The evidence was contradictory and inconclusive.

Hypothesis 6b--that the expository program condition (more culturally attuned) was relatively more productive for learners with lower literacy skills than for those with higher literacy skills--was not supported. The findings were mixed and somewhat contradictory.

Hypothesis 7a--that the group interaction condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners--was supported.

Hypothesis 7b--that the expository program condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners--was not supported. Scattered but consistent

evidence supported the alternate hypothesis that the discovery program condition is relatively more productive.

Hypothesis 8a--that the group interaction condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners--was not supported. Several measures of strategies and affective responses to instruction supported the alternate hypothesis that the individualized condition is more productive.

Hypothesis 8b--that the expository program condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners--was partially supported. Some evidence, however, supported the alternate hypothesis that the discovery program condition is relatively more productive.

#### Discussion: Experimental Findings

In Chapter IV of this dissertation, results from statistical analyses of research data were presented. The discussion which follows here attempts to interpret these findings.

#### Hypothesis 1

The data supported Hypothesis 1--that learning occurs through PI in a Brazilian milieu. Such findings harmonize with Schramm's (1964:3,4) conclusion (based on early investigations of PI) that many kinds of students learn many kinds of subject matter through many kinds of

programmed instruction. The present research extends the generalizability of earlier findings to another subject area (nutrition) and to other students (adults in Brazil).

### Hypothesis 2a

The data failed to support Hypothesis 2a--that the group interaction condition (more culturally attuned) is more effective than the individualized interaction condition (less culturally attuned). The findings were somewhat contradictory, and were not statistically significant.

A probable explanation for the paucity of significant findings related to this hypothesis is that the contrast between the individualized and group treatment conditions was not sharp enough. Students were strongly urged to work alone in the individualized treatment, and to work together in the group treatment. However--in order to create a natural teaching environment (as well as to maximize participant observation within the constraints of treatments)--students were given considerable freedom to interact in natural ways. The result was a tendency (possibly growing out of formal school experiences) to prefer working alone in both treatments. Thus, even though students in the group treatment worked together relatively more than students in the individualized treatment, the "individualized" and "group" treatments actually compare varying degrees of individualized

instruction rather than clearly contrasted individualized or group conditions of instruction.<sup>1</sup>

Another possible reason for sparse findings related to the above hypothesis is that the treatment effects were overwhelmed by interactions with characteristics of learners, such as modernity and motivation. Findings related to other hypotheses considered in this research (especially Hypotheses 7a and 8a, discussed later in this chapter) would admit such an explanation.

#### Hypothesis 2b

The data lent partial support to Hypothesis 2b-- that the expository program condition (more culturally attuned) is more effective than the discovery program condition (less culturally attuned). Significant findings on measures of acquisition of content (Exercises 1 and 2) and strategies employed in learning (accuracy and completeness of programmed lessons, and time required to complete lessons) support the hypothesis.

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<sup>1</sup>The problem encountered here illustrates a recurring dilemma in curriculum research. A decision to control the teaching environment increases the precision of the treatment (and, consequently, the possibility of statistically significant findings) but decreases the applicability of findings to real settings in which teaching variables can and do interact in a variety of ways. On the other hand, a decision to create a less controlled teaching environment increases the applicability of research results to natural settings, but--through the inherent risk of confounding variables and weakening contrasts between treatments--decreases the possibility of statistically significant findings.



These significant findings become less convincing when interpreted in the light of trends and interactions which tend to support an alternate hypothesis that the discovery program condition is more effective. Analyses of several measures (Balance of Diet, HI-HI-LO-LO Pattern, and Added Course Reasons) revealed interactions in which students in the discovery treatment showed learning gains one week after instruction, while students in the expository treatment showed no learning gains during this period of time. Findings from analyses performed on other measures (Copying Feedback and Choosing PI instead of a Story) seem to indicate that students in the discovery treatment were thinking more and were enjoying the instruction more.

Mixed findings lead to speculation that, while initial achievement may be greater in the expository treatment, more thinking and more permanent learning may occur in the discovery treatment. Previous research reviewed by Wittrock (1966), Tanner (1969), and Hermann (1969), and discussed earlier in this dissertation, would support such a conclusion.

### Hypothesis 3

The data supported Hypothesis 3--that the literacy skills of learners affect the degree to which PI (under all treatment conditions) facilitates learning. The only exceptions to otherwise consistent findings were negative

correlations between literacy skills and (1) ability to plan a varied diet, (2) a tendency to choose PI instead of a story, and (3) a tendency to work alone rather than with others. Possible explanations for these inconsistencies are not difficult to surmise. Learners with higher literacy skills could have planned less varied diets because they are better integrated into a traditional system of schooling which rewards convergent, repeated behaviors, rather than the divergent, flexible behaviors required in varying food choices on repeated tests. Learners with higher literacy skills could have chosen a story rather than PI because they had already mastered the programmed lessons (or perhaps were bored with the lessons, finding them too easy). Learners with higher literacy skills could have preferred working alone because they were more competent and confident. They did not need help from others, and become impatient with slower learners.

#### Hypothesis 4

The data partially supported Hypothesis 4--that the modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning. The evidence was scattered, and not always in the direction hypothesized.

Possible explanations for sparse and mixed findings are: (1) that the population considered in this study (semi-schooled youths and adults residing in São Paulo) was

relatively homogeneous on modernity variables so that differential effects were too small to be observed; (2) that modernity variables are relatively independent factors which may be expected to relate to each other and to dependent variables in different ways in differing settings; (3) that modernity variables interact with expository-discovery and individualized-group treatments (findings related to Hypothesis 7 would admit such an explanation); (4) that more modern learners show symptoms of waning interest and motivation earlier than their more traditional counterparts (more inconsistencies were observed on the last lessons and delayed posttests); (5) that attitudinally modern learners are more sophisticated than traditional learners in their perceptions of course expectations, deciding, for example, to drop pretest reasons for food choices (which have a folkloric quality about them) in favor of course-based (more intellectual) reasons for choices; and (6) that on at least one measure (kind of school experience) factors other than modernity were being measured.<sup>2</sup>

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<sup>2</sup> In the present study, the students who reported the most modern school experiences happened to be attending an adult literacy school where relatively modern teaching methods were being employed. Thus this measure could more accurately be interpreted as a measure of the relative effectiveness of adult remedial or childhood education.

Hypothesis 5

The data partially supported Hypothesis 5--that motivation to learn affects the degree to which PI (under all treatment conditions) facilitates learning--on measures of sex and community participation. Mixed and inconclusive findings failed to support the hypothesis on a measure of age. Younger learners appeared to be faster and more efficient than older learners (showing greater learning gains on measures of accuracy and stability of responses to programmed items, time required to complete programmed lessons, shifts in focus, and unplanned, HI-HI-LO-LO Pattern, responses). On the other hand, older learners appeared to achieve more on oral measures of information and cognitive gains (unprompted recall of course information, and a tendency to add course-based reasons for food choices to earlier reasons given). These findings may indicate that older learners (when compared with younger learners) have developed greater skills in taking oral tests (perhaps through greater exposure to traditional kinds of school experiences in which oral recitations and examinations are practiced). The findings could also indicate that, since oral measures are less dependent upon literacy skills than are written measures, older learners, who tend to have more difficulty in reading and writing, have a better opportunity to demonstrate what they have learned orally than in writing.

Hypothesis 6a

The data partially supported Hypothesis 6a--that the group condition of interaction (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills. The findings were contradictory and inconsistent, possibly because not all of the learning which occurs in groups is desirable learning! Less literate learners--when compared with more literate learners--are relatively more successful in learning desirable behaviors through the group treatment (such as planning a balanced diet, making thoughtful choices of foods, and doing accurate and complete work on programmed lessons). On the other hand, these less literate learners are also relatively more prone to learn undesirable behaviors through the group treatment (such as copying feedback and shifting focus of attention).

Hypothesis 6b

The data revealed mixed findings which failed to support Hypothesis 6b--that the expository program condition (more culturally attuned) is relatively more productive for learners with lower literacy skills than for those with higher literacy skills. The expository method was relatively more productive for learners with lower literacy skills than for those with higher literacy skills on several measures of learning (completeness and accuracy of programmed lessons, working with others, and choosing

popular foods). At the same time, on other measures of learning (Stability of Responses, Copying Feedback, Unprompted Recall, Added Course Reasons) more thinking appears to be going on among less literate learners in the discovery method. Here again, as in earlier findings related to Hypothesis 2b, a pattern emerges which suggests that, at least when thoughtful behaviors are criteria for learning, discovery teaching may be more effective than expository teaching. Less literate students (those who have been less successful in coping with traditional schooling) appear to achieve relatively more through the discovery method on measures of thinking.

#### Hypothesis 7a

The data supported Hypothesis 7a--that the group interaction condition (more culturally attuned) is relatively more productive for traditional learners than for modern learners. The fact that all significant findings and trends were in a single direction (the direction hypothesized) lends credence to an earlier suggestion that individualized-group treatments interact with characteristics of learners (in this case, with modernity).

#### Hypothesis 7b

The data failed to support Hypothesis 7b--that the expository program condition (more culturally attuned) is relatively more productive for traditional learners than

for modern learners. On the contrary, the findings provided scattered but consistent evidence to support an alternate hypothesis that the discovery program condition is relatively more productive for traditional learners.

A possible explanation for these unexpected findings is that more modern learners (who are better integrated into formal educational structures) have successfully learned to learn through expository methods. They employ "meaningful reception learning" (Ausubel 1968) in integrating new information into existing cognitive structures. Because of their success in learning through expository methods, they have little desire for change. Discovery teaching, with its many novel features, is perceived as a threat. On the other hand, less modern learners (who are less integrated into existing educational structures) have been less successful in coping with expository teaching methods; they resort to ineffective, rote strategies of learning. Discovery methods force these less modern learners to develop new (more thoughtful, and hence more effective) strategies. Thus less modern learners--when compared with more modern learners--find the discovery method relatively more productive.

#### Hypothesis 8a

The data failed to support Hypothesis 8a--that the group condition of interaction (more culturally attuned)

is relatively more productive for less motivated learners than for more motivated learners. Instead, the alternate hypothesis--that the individualized treatment is relatively more productive for less motivated learners--was supported on several measures.

Once again, as in data related to Hypothesis 7a, the findings provide evidence that individualized-group treatments interact with characteristics of learners, making certain conditions of instructional interaction more effective for some learners than for others.

The direction of the above findings--pointing toward relatively greater productivity of the individualized treatment with less motivated learners--is probably related to the particular measure of motivation employed in the analyses (community participation) rather than to a larger "motivation" construct. Logically, persons who are more active participants in a community activity would tend to develop greater skills in working with groups than would learners who are less active participants.

#### Hypothesis 8b

The data lent only partial support to Hypothesis 8b--that the expository program condition (more culturally attuned) is relatively more productive for less motivated learners than for more motivated learners. Some of the evidence supported an alternate hypothesis that the



discovery program condition is relatively more productive for less motivated learners.

From the above findings a profile emerges of less motivated learners who are frustrated, anxious, and uncomfortable in the discovery treatment (making relatively more mistakes on programmed lessons, feeling relatively more pressure from competition with peers and limitations on time, responding less favorably to the method than to a story method, and preferring to work alone). At the same time, these less motivated learners--when compared with their more motivated counterparts--are apparently thinking more and achieving more through the discovery method (gaining relatively higher scores on measures of balance and variety in planning a diet, giving relatively more stable answers to programmed items when time and peer pressures were removed [at home], copying relatively less feedback, showing relatively less tendency to shift focus of attention among food groups, and showing relatively less tendency to make thoughtless [wild] choices of foods).

The above findings are quite similar to findings related to other hypotheses in which expository and discovery treatments were compared (Hypotheses 2b, 6b, and 7b). The discovery treatment--when compared with the expository treatment--appears to be relatively more productive for less literate, less modern, and less motivated learners on measures of thoughtful behaviors and relatively permanent learning gains.

### Discussion: Participant Observation

In the present research, an attempt was made to combine experimentation with participant observation. These activities were not always compatible. More observations were made in smaller groups (where data gathering activities were less demanding, and interaction less complex) than in larger groups. Since full attention could not be given to observation, selective perception of environmental stimuli tended to sort out those occurrences which lent support to hypotheses, or which made an impact through their novelty.

In spite of the limitations imposed upon observation through an experimentally designed study, an effort was made to provide a continuous record of experiences during field work.<sup>3</sup> A file of 364 observations resulted from this effort. Observations considered most relevant to the purposes of the present research are summarized below.

#### Observations of Settings

At each site, the Session Observation Form (Appendix E) provided a systematic record of environmental variables such as distractions, improvisations, and

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<sup>3</sup>Field experiences included 32 hours in testing materials with informants, 48 hours in teacher training, 80 hours of conversations with local leaders, and 108 hours of interaction with students in class situations.

differences among local coordinators. Distractions from street noise, children, and curious onlookers were consistently present. Another frequent annoyance was lights going out. Improvisations (such as using wood slabs for tables and kitchen sinks as counters for materials) were also common. At one site, the available furnishing were nursery school tables and chairs, and one of the students was six feet tall! The effectiveness of coordinators (persons responsible for local arrangements) also varied considerably from site to site.

#### Observations on Composition of Intact Groups

Both homogeneity within groups and heterogeneity among groups were observed. At most test sites, a self-selection process resulted in homogeneity within groups. Persons dissimilar from their peers in some important way (extremely fast or extremely slow learners, for example) tended to withdraw from the course.

Heterogeneity among groups on variables such as age, sex, urbanity, social status, literacy skills, motivation, and religion was also observed. Such observations often proved to be inaccurate. In one "middle class" neighborhood, for example, the local coordinator was certain that most residents had secondary schooling; she was surprised to find that a relatively large number of the residents had completed only primary school. In contrast, a coordinator in a "poor" neighborhood assured

the investigator that no one had attended secondary school; five persons with secondary schooling appeared for the treatment!

### Observation on Time

Several observations reflect conflicting perceptions of time. São Paulo residents--caught in a rapid transition from traditional to modern values--revealed a paradoxical combination of weak time consciousness and acting as if always in a hurry. Students arrived at treatment sessions anywhere from twenty minutes early to two hours late. At some sites everyone arrived at once; at others persons straggled in, making it necessary to repeat instructions and tests for late-comers.

Cross-national differences in perceptions of time were noted. A Brazilian teacher-assistant was observed marking time on programmed manuals by five-minute intervals, and on intelligence tests by one-minute intervals. At the same time, the American investigator was marking manuals by one-minute intervals and intelligence tests by one-second intervals!

### Observations of Student Responses to Nutrition Information

Nearly all of the groups showed a keen interest in the subject matter related to nutrition. Recurring comments provided evidence that learning was taking place: "This course helps me do my grocery shopping"; "When I eat,

I think about which foods belong to which groups"; "We are planning our menus at home around the four food groups"; and "I wish my daughter could take this course." At least one student learned the lesson too well. Her comment in an oral interview was, "I eat enough fruit now, something I didn't do before." This same woman was given a low score on the written posttest because the diet she planned was badly overbalanced with fruits and vegetables!

The investigator and teacher assistants were frequently called upon to serve as nutrition consultants, and to accept the respect due to authority persons. They were often asked questions such as "Is it harmful to drink coffee?" or "How can I loose weight?" One lady pulled her muscular 18-year-old son into the classroom by his coat sleeve and demanded, "Would you tell my son he should eat a meal in the evening, and not just bread and milk?"

#### Observations of Cognitive Behaviors

Students had difficulty with cognitive processes, such as generalizing, remembering, and linking reading with active responding.

Lack of interest in or experience with making generalizations was observed. One woman, for example, insisted that papaya and oranges are not alike. A colleague explained that they were both fruits. The retort of the first woman was, "What good does it do to put things

together that way? When I go to the market, I've got to ask for oranges."

High anxiety about forgetting or making mistakes was noted. A typical comment was "It's so easy, and I still forget." On the oral posttests, some students tried to remember what they had said earlier so that they would not repeat or contradict themselves.

Many learners found it hard to link reading with active responding. They would read an instruction such as "open the envelope inside the back cover," and ask, "Shall I open the envelope now, or go on reading?"

#### Observations of Affective Responses

Strong expressions of liking were dominant at all test sites. Exclamations such as "This is fun!" "This is neat!"<sup>4</sup> "This course is too short," and "I'm going to miss these little books" were heard repeatedly. The students liked being interviewed. In addition, the certificate at the end of the course provided strong extrinsic motivation.

Some expressions of negative affect were also noted. Students were afraid of taking tests. At least at first, they perceived the programmed manuals to be tests, and were very concerned about careful handwriting and not making errors. Enthusiasm began to wane as the novelty of the course wore off. By the third week, attendance had

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<sup>4</sup>Portuguese, bacana.

dropped by 25 per cent, many of the students were less punctual, and some were completing homework assignments after they arrived at the class sessions.

#### Observations of Psychomotor Skills

At almost every site, some persons were weak in reading and writing skills and had difficulty keeping pace with the group. Many students found writing tiring. One woman exclaimed that she had never written so much in her life. Typically, some students forgot their glasses and would go home to get them or borrow a pair from a colleague.

Sex differences in manual dexterity were noticed in a card sorting task required in the first discovery lesson. Women easily sorted the decks of food cards, while men found the task much more difficult.

#### Observations of Student Adaptations to PI

Students in all treatments adapted quickly to the use of PI. Most comments, questions, and other observable reactions to PI were made within the first half-hour after the method was introduced. Beyond this initial period, students were accepting and behaving appropriately to the expectations of the method. An overheard conversation during the second session was typical: "The course is easier today." "That's because we've been practicing this method."

A strong tendency to copy the feedback was observed. In a typical incident, a student read a frame which asked him to choose a fruit he liked and write it in the blank. Instead, he carefully copied the feedback: "Your choice." Happily, some of the students readily grasped the purpose of feedback. One woman said, "I made mistakes, but I didn't correct them. I wanted to check where I erred in order to learn."

A generalized pattern of impulsiveness was observed across all groups. Many students tried to guess what to do next instead of letting the book tell them.

Students enjoyed doing the lessons at home. Comments on how pleasant it was to work on the lessons during leisure time were heard at several sites.

#### Observations of Responses to Individualized-Group Methods

The individualized treatment allowed few observations. Students showed a tendency to help colleagues who were having difficulty with reading or comprehension, but for the most part they worked quietly and alone.

At all sites where group treatments were employed, an initial resistance to being required to work together was noted. In more cohesive groups, the resistance broke down rapidly. A strong esprit de corps evolved in which students helped each other, joked, and engaged in lively discussions and arguments. In less cohesive groups, work in teams was difficult to establish. Students became



impatient with each other. The group treatment was least effective in a literacy school setting where students had been told by local teachers not to converse in the classroom. One younger woman at the literacy school asked, incredulously, "You mean you really want us to talk aloud to each other?"

Ample time was a crucial factor in implementing the group treatment effectively. The condition did not function well when pressures were created by a late hour on a week night, or by a fixed class period in a school situation.

The group condition functioned best when teachers and the investigator maintained a low profile. If teachers were too readily available, there was a tendency to revert to teacher-led discussions. The teacher-assistants in this research became adept at refusing to give help with comments such as "The book is your teacher," or "See if you can solve this problem among yourselves."

Three roles developed within almost every group: (1) surrogate teachers, who became task leaders, explaining lessons and helping colleagues; (2) jokesters, the social leaders of the groups whose constant jokes were rewarded with laughter and appreciation from their colleagues; and, (3) resisters, who wanted to work alone, sulked, argued, and were generally impatient and disagreeable.

Observations of Responses to  
Expository-Discovery Methods

Qualitatively different classroom climates were created by expository and discovery conditions of PI. The expository treatment sessions were characterized by mildly positive affective expressions. By comparison, the discovery treatment sessions were much more charged with emotion. The students in discovery treatments were alternatively excited, enjoying themselves, nervous, tense, anxious, arguing, and demonstrating feelings of frustration and hostility toward the method.

The students in expository treatment found the method easy to cope with. They did not need or want the eight frames of teacher guidance which were provided to introduce PI. They understood what was expected of them immediately, and worked independently, efficiently, and confidently. Students and teams competed among themselves to see who could finish the lesson first. They made few requests for teacher help.

In contrast, students in discovery treatments had difficulty in coping with requirements such as reaching generalizations inductively. They required more support from both their colleagues and the teachers. Frequent expressions of frustration at "Socratic" elements in the lessons were noted. For example, the first lesson called for organizing food cards into groups and preparing a food chart. As soon as this task was accomplished, students

were asked to rescrumble the cards. The reaction of one student to this requirement is typical: "The book must be joking. I'm going to rest a little first."

### Conclusions

At least six conclusions may be drawn from the findings reported in the present research:

1. PI provides a promising tool for development education. Subjects in the present research adapted quickly to PI under all treatment conditions. The method was effective in teaching elementary principles of nutrition to semi-literate students in Brazil. Overwhelming evidence that PI teaches (from both the present investigation and earlier investigations) leaves little room for doubt that similar efforts with similar students in similar cultures will meet with equal success. The fear that programmed instruction--a method developed in a technological society--may be ineffective in a traditional milieu seems to be poorly founded.

2. While adaptations of PI in the direction of group methods are not contraindicated by findings from the present research, such adaptations are not equally beneficial for all learners. Adaptations of PI in the direction of group methods appear to be relatively more productive for less modern and more motivated learners

than for more modern and less motivated learners.<sup>5</sup> A comparison of negative and inconclusive findings related to Hypotheses 2a and 6a (that the group interaction condition (1) is more effective than the individualized condition, and (2) is relatively more productive for learners with lower literacy skills) with quite consistent findings related to Hypotheses 7a and 8a (that the group interaction condition is relatively more productive for less modern and less motivated learners) supports such a conclusion.

3. Adaptations of PI in the direction of discovery methods appear to be beneficial. Although initial learning appears to be greater in the expository condition of PI, more thinking and more permanent learning seem to occur in the discovery condition. Findings related to hypotheses comparing expository and discovery treatments ( $H_{2b}$ ,  $H_{6b}$ ,  $H_{7b}$ , and  $H_{8b}$ ) support such a conclusion.

4. Highly literate, highly motivated learners achieve more through PI than less literate, less motivated learners, irrespective of cultural adaptations of the

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<sup>5</sup> Hypothesis 8a stated that the group condition would be relatively more productive for less motivated learners. In most analyses related to this hypothesis, the group condition of interaction was found to be relatively more productive for more motivated learners. This unexpected finding may be due to the particular measure of motivation employed in the analysis (community participation) rather than to a relationship to a larger "motivation" construct.

method. Findings related to Hypotheses 3 and 5 supported conclusions that literacy skills and motivation are related to achievement through PI. Contradictory and inconclusive findings failed to support Hypotheses 6 and 8, that cultural attunements of PI are relatively more productive for less literate, less motivated learners, than for more literate, more motivated learners. A comparison of the positive findings related to  $H_3$  and  $H_5$  with the negative findings related to  $H_6$  and  $H_8$  would suggest that the literacy skills and motivation of learners are relatively more important than cultural attunements of PI in predicting learning outcomes. More literate, more motivated learners appear to achieve more through PI than less literate, less motivated learners, regardless of efforts to adapt the method to the culture of the learners.<sup>6</sup>

5. Adaptations of PI in the direction of group and discovery teaching methods are relatively more productive for traditional learners than for modern learners. This conclusion is supported by a comparison of relatively inconclusive findings related to Hypothesis 4--that the modernity of learners affects the degree to which PI (under all treatment conditions) facilitates learning--with the consistent and quite conclusive findings

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<sup>6</sup>It is conceivable, of course, that forms of cultural attunement other than those assumed to be important in the present research would produce different results and different conclusions.

related to Hypotheses 7a and 7b in which less modern learners--when compared with more modern learners--achieved relatively more through group and discovery treatments.

Interestingly, the interaction between modernity and expository-discovery treatments was not in the direction hypothesized. Hypothesis 7b stated that the expository program condition (more culturally attuned) would be relatively more productive for traditional learners than for modern learners; instead, the discovery program condition was found to be relatively more productive for these learners. Implications of this unexpected finding are discussed below.

6. The conception of "cultural attunement" embedded in the rationale for hypotheses tested in the present research (pages 83-88) must be reformulated (1) to distinguish between "attunement" as a process and "attunement" as a product; and (2) to account for the complexity of factors involved in attuning teaching to culture.

Within the context of the present research, "attunement" has been treated as a process. An attempt has been made to adapt teaching to culture along expository-discovery and individualized-group dimensions. Clearly a process is not the same as a product; attempting is not the same as achieving. Mixed and unexpected findings in the present investigation (for example, the discovery treatment, by definition less culturally attuned, and the group

treatment, by definition more culturally attuned, were both more productive for less modern than for more modern learners) indicate that efforts to attune teaching to culture were not wholly successful. A true matching of teaching and culture (attunement as a product) is probably not attainable without an exhaustive awareness of complex factors involved in adapting teaching to culture (attunement as a process). An understanding of factors inherent in individual differences among learners appears to be especially crucial in adapting teaching to culture (cf. Cronbach 1966). In other words, the present state of the development of ethnopedagogical theory is not adequate as a basis for highly reliable (predictable) attunement processes. Efforts to attune teaching methods to the cognitive characteristics, learning styles, pedagogical expectations, and preferences of learners should be carried out with due caution and humility!

The inadequacy of the present state of knowledge does not mean that attempts to attune teaching to culture are futile; on the contrary, such efforts provide indispensable data for developing cross-cultural teaching theory. Findings from the present research, for example, contributed to ethnopedagogical theory by revealing certain crucial factors along an "extent of schooling" dimension of learner variables which was overlooked in the formulation of hypotheses: (1) individual differences among learners in their ability to respond to school and non-school

learning experiences; (2) the expectations of learners in school and non-school environments; and (3) individual preferences for teaching methods growing out of successful learning experiences within school and non-school environments. Further investigations within an ethnopedagogical framework may be expected to make similar contributions to cross-cultural teaching. Hopefully, an accumulation of such contributions will eventually make a true cultural attunement of instruction possible.

#### Implications for Further Research

One of the purposes of an exploratory study, such as the present one, is to generate suggestions for further research. Some directions which future investigations might take are suggested below.

#### Replications

The findings reported in this dissertation may well be peculiar to the students (semi-literate adults in São Paulo, Brazil), subject matter (nutrition) and time span (three sessions) chosen for the study. Investigations utilizing other subjects (such as university students), other subject matter (such as literature) and a longer time span (a month or more) could provide interesting comparisons of the effects of educational levels, subject matter, and the length of instruction on learning outcomes through adaptations of PI.



If replications of the present study were undertaken, efforts should probably be made (1) to reduce the number of dependent variable measures employed (perhaps through factor analyses to select key measures of highly related phenomena), and (2) to increase the control exercised in the individualized-group treatments. Such modifications should not be made, however, at the expense of loss of information or naturalness of treatment conditions.

### Studies of Cognitive Processes

One of the by-products of the present research has been extensive data on the responses of students to programmed items. A careful record has been kept of each student's response to each item in each programmed lesson. Verbatim reports of errors and divergent responses have also been recorded. (All records have been kept by case numbers, so that information is available for each subject concerning his age, sex, schooling, intelligence, community participation, modernity, scores on dependent variable measures, and the treatment to which he was assigned.) To date, these data on responses to programmed items have not been analyzed. Such analyses would provide useful information on the cognitive processes of semi-literate learners. Applications of such findings to cross-cultural teaching would be helpful in development education efforts.

### Development of Appropriate Statistical Techniques

Typically, an investigation which delights the curriculum researcher becomes a statistician's nightmare. The reason for this tension is not difficult to find: statistical techniques which are appropriate in laboratory-like settings are inadequate when applied to the real world of teaching. In real settings, predicted effects usually are not substantial enough to be sustained; confounding variables and interactions inevitably weaken effects which in laboratory settings might easily be statistically significant.

The present study has been conducted in the field within the curriculum research tradition; the problems which have been encountered in analyzing and interpreting data are typical of such research. The quite complete documentation of this investigation provides the raw material for a study of possible solutions to problems created when field-based data are analyzed through laboratory-based procedures.

### Studies of Modernity and the Effects of Schooling

The modernity variables employed in this research deserve a more thorough examination than they have been given in the present context. Data from this study could be useful, for example, in examining the validity of a

modernity construct; ways in which so-called "modernity" variables are related to each other and to other independent, dependent, and treatment variables could be explored.

Similarly, data on the effects of schooling upon learning outcomes have been handled only superficially in the present research; they merit deeper analytic probings. Examples of questions which could be explored through these data are the effects of childhood versus adult remedial education on learning outcomes, or the effects of learning strategies employed (processes) on learning outcomes (products).

### Implications for Teaching

Because the present research has been conducted in the field in a reality setting, the resultant findings have immediate and direct implications for teaching. Some of these implications are discussed below.

### Implications for Programmed Instruction

In the present research, PI was found to be an effective method of teaching semi-literate adults in a Brazilian milieu. Cross-cultural educators may introduce PI to these learners or to similar learners with reasonable confidence that learning will occur through the method. Suggestions which should maximize the effectiveness of

learning through PI include: (1) developing or selecting units of study which encourage thoughtful, constructed, and divergent responses to programmed items; (2) minimizing opportunities to copy feedback or to engage in other rote learning and test-taking behaviors; (3) providing training in linking reading with active responding; and (4) keeping peer pressures and time pressures at a minimum.

#### Implications for Discovery Teaching

Findings from the present research do not justify the hesitancy educators sometimes feel about introducing "foreign" methods, such as discovery teaching, into a culture. Discovery methods appear to be at least as effective as expository methods for Brazilian learners (they even surpass expository methods on some measures of thoughtful behaviors and retention of learning). The discovery method seems to be especially beneficial for learners who are less integrated into the formal educational system (less literate, less modern, and less motivated learners).

#### Implications for Group Interaction in PI

Findings from the present research do not contraindicate the use of PI in group modes. Group methods were shown to be at least as effective as individualized methods; they appear to be especially beneficial for less modern

learners. The group use of PI needs to be introduced carefully, however. Initial resistance to the method can be anticipated; group skills need to be taught. Unnecessary time pressures and competitiveness should be avoided. Efforts to introduce group conditions of interaction will be most successful in cohesive groups where a strong esprit de corps is present or can be created.

#### Implications for Cross-Cultural Teaching

In addition to the method-specific implications for teaching discussed above, findings reported in the present study have other, more generalized, applications to cross-cultural teaching.

Cross-cultural teaching must be flexible. An over-emphasis on one medium or one method should be avoided. In this study, for example, older learners were shown to achieve more on oral measures while younger learners achieved more on written measures. Such differences among learners within and across cultures should be taken into consideration in a comprehensive plan for teaching.

Cross-cultural teaching must include training in thinking skills. Most of the semi-literate learners in this study found cognitive requirements (e.g., inductive reasoning) extremely difficult to cope with. Provision must be made for teaching how to think (strategies and processes) as well as what to think (content).

In teaching across cultures, the educator has at least three options. His first option is to introduce new methods all at once and with no modifications; students must adapt to him. The second option available to the educator is a wholesale adaptation of instructional procedures to the expectations of the learners, carefully avoiding "foreign" innovations. As a third option, the educator may introduce planned change, initially accommodating teaching to the students' style of learning, but ultimately guiding the students toward optimal learning practices. The findings of the present research would encourage cross-cultural educators to opt for the third strategy, introducing planned change.

Introducing innovations in teaching (such as discovery and group methods) may be especially beneficial to less integrated, less successful learners within a society. Quite possibly, some of the school dropouts and misfits in traditional societies are students who have developed one set of learning habits through their non-school environment, and have been unsuccessful in developing a new set of habits to fit the requirements of the formal educational structure. For these learners, adaptations of instruction in the direction of cultural attunement to the non-formal, non-school milieu may be essential if effective learning is to occur.

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## **APPENDICES**

## **APPENDIX A**

### **DESCRIPTION OF TEST SITES**

APPENDIX A  
DESCRIPTION OF TEST SITES

Group Number	Dates of Treatment	Kind of Treatment	Location (Bairro)	Teacher	Kind of School	Zone of São Paulo
1	5/27 6/3, 10	Individualized Discovery	Feirreira	Hitoshi Watanabi	<u>ad hoc</u>	West
2	5/30 6/6, 13	Group Discovery	Brooklin	Waldemur Corrêa	<u>ad hoc</u>	South
3	6/17, 24 7/1	Individualized Expository	Veleiros	Lois McKinney	women	South
4	6/18, 25 7/2	Group Expository	Itaberaba	Helena Rosa	women	North
5	6/20/27 7/4	Individualized Expository	Brás	Hitoshi Watanabi	women	East
6	7/8, 15,* 22, 29	Group Expository	Feirreira	Waldemur Corrêa	<u>ad hoc</u>	West
7	7/11, 18 25	Individualized Expository	Campo Limpo	Waldemur Corrêa	<u>ad hoc</u>	West
8	7/22, 29 8/5	Individualized Discovery	Caxinguf	Helena Rosa	women	West
9	8/6, 13, 20	Group Discovery	Guarulhos	Helena Rosa	women	North
10	8/16, 17, 24, 25,** 28, 29, 31; 9/1, 4, 5	Individualized Expository	S <sup>to</sup> Amaro	Helena Rosa	literacy school	South
11	same	Group Expository	same	Hitoshi Watanabi	same	same
12	same	Individualized Discovery	same	Waldemur Corrêa	same	same
13	same	Group Discovery	same	Lois McKinney	same	same
14	8/18, 23, 30	Group Discovery	Caxueirinha	Hitoshi Watanabi	women	North
15	8/13, 20, 27	Individualized Discovery	Veleiros	Helena Rosa	<u>ad hoc</u>	South
16	8/26; 9/2, 9	Group Expository	S <sup>to</sup> Amaro	Helena Rosa Hitoshi Watanabi	<u>ad hoc</u>	South

\*Treated in sub-groups beginning on July 8 and 15, respectively.

\*\*Time restrictions of a formal classroom necessitated additional sessions for interviewing and testing.



**APPENDIX B**

**PUBLICITY AND INFORMATION USED IN**

**ARRANGING TEST SITES**

APPENDIX B  
PUBLICITY AND INFORMATION USED IN  
ARRANGING TEST SITES

RESPONDENDO AS SUAS PERGUNTAS SOBRE ....

O ESTUDO PEDAGÓGICO INTER-CULTURAL

1) O que é o "Estudo Pedagógico Inter-Cultural"?

É uma pesquisa que quer descobrir algumas das adaptações que são necessárias quando métodos pedagógicos desenvolvidos num ambiente estão sendo utilizados em outro.

2) Por quem é promovido?

É promovido no Brasil pela AETTE (Associação Evangélica para o Treino Teológico por Extensão). Nos Estados Unidos é promovido pelo "Institute for International Studies in Education" Michigan State University, e pelo "Midwestern Universities Consortium for International Activities", que também tem sede em E. Lansing, Michigan. Esta última entidade é uma junta que representa cinco universidades do Meio-Oeste dos EE.UU.A. Recebe uma verba da Fundação Ford. Tanto professores universitários, como alunos dos cursos pós-graduados avançados, concorrem para bolsas de pesquisa pagas deste fundo. A diretora do estudo ganhou uma bolsa deste fundo numa concorrência feita entre alunos pós-graduados.

3) Quem é a Diretora do Estudo?

O estudo é dirigido por Miss Lois (Loide) McKinney, professora de pedagogia, candidata ao doutorado (Ph.D.) em educação, pela Universidade do Estado de Michigan. O estudo fornecerá a base tanto para a dissertação (tése) que ela escreverá, como de artigos que serão publicados em revistas profissionais no Brasil e nos Estados Unidos.

D. Loide é missionária da Missão Batista Conservadora. Durante seis anos lecionou no Seminário Teológico Batista de Leiria, Portugal (entre 1960-1965). Também lecionou de 1966-1969, no Seminário Teológico Batista do Nordeste em Floriano, Piauí, Brasil.

Antes de ser missionária, D. Loide trabalhou como orientadora

educacional com a "Scripture Press", uma das maiores casas publicadoras evangélicas, dos EE.UU.A.

4) Em que consiste o Estudo?

O estudo tem duas etapas. Na primeira etapa, que durará aproximadamente seis semanas, as lições dadas por meio de instrução programada, serão experimentadas cuidadosamente num "programa piloto" na Congregação Batista de Jardim Cidália em São Paulo (afiliada à Igreja Batista do Brooklin).

Na segunda etapa, D. Loide, juntamente com estudantes da Faculdade Teológica Batista de São Paulo, dará cursinhos em várias igrejas e congregações. O estudo atingirá 120 alunos em 12 congregações. O curso iniciará-se no dia 27 de maio e irá até o dia 16 de setembro. (27/5 - 16/9)

5) Qual o Cursinho Que Vai Ser Lecionado?

Trata-se de um cursinho de nutrição num nível básico. Serão dadas noções de uma dieta adequada.

6) Quem São Os Alunos?

Os alunos são membros ou amigos das igrejas evangélicas que serão matriculados neste curso. Todos os alunos devem ter mais de quinze anos de idade e precisam saber ler e escrever. Mas não podem ter nenhum curso além do primário.

7) Quais Os Resultados Esperados Do Estudo?

Esperamos ter um conhecimento mais profundo sobre a instrução programada e a sua aplicação, que a tornará num método mais eficaz no ambiente brasileiro. Através dos dados recolhidos, poderemos dizer com certa confiança, quais são alguns dos processos e métodos de ensino que facilitarão a aprendizagem dos alunos, tais como os que estão matriculados neste projeto.

O parecer do Estudo Pedagógico Inter-Cultural terá aplicação no treino teológico por extensão no Brasil, sendo este treino um esforço que depende em grande parte dos métodos auto-didáticos.

Para mais informações, escreva à Diretora do Estudo:

Lois McKinney, Diretora  
Estudo Pedagógico Inter-Cultural  
Caixa Postal 30.259  
São Paulo, SP. Brasil

# ESTUDO PEDAGÓGICO INTER-CULTURAL

CAIXA POSTAL 30.259  
01000 SÃO PAULO, SP.

Telefone: 269-1191

## RESPONSABILIDADES DO COORDENADOR

LOIS MCKINNEY  
DIRETORA

- 1) Combinar com o pastor ou entidade responsável pela congregação.

### Vantagens na pesquisa:

O parecer do estudo terá aplicação no treino teológico por extensão.

Uma ótima oportunidade para convidar não-crentes à igreja.  
Os ensinamentos sobre nutrição tem valor em si.

- 2) Combinar com a diretora do estudo, para que ela possa falar com o pastor, ou, se for possível, apresentar a pesquisa durante um culto da igreja.

- 3) Combinar com 15 alunos para virem no dia marcado.

### Todos devem

ter 15 anos ou mais de idade  
saber ler e escrever  
não ter mais do que primário completo  
poder vir as três semanas (uma vez por semana)

### IMPORTANTE;

Ninguém pode matricular-se depois da 1ª semana.  
Só temos 15 vagas.  
Tente incluir homens.  
Tente incluir não crentes.

### Vantagens para o aluno

Ajudando numa pesquisa que tem valor na obra do Senhor  
Aprendendo coisas úteis e interessantes sobre nutrição  
Curso gratuito com certificado no fim  
Boa convivência  
Meio de evangelismo (trazendo pessoas amigas)

- 4) Arrumar a sala antes de cada aula

Mesas e cadeiras para 15 pessoas  
Duas mesinhas extras para matérias e entrevistas  
(em sala separada, se for possível)

- 5) Ajudar como monitor durante a aula - distribuindo trabalhos, etc.

promovido pela Associação Evangélica Teológica para Treinamento por Extensão

RICHARD STURZ, SECRETARIO-EXECUTIVO

# ESTUDO PEDAGÓGICO INTER-CULTURAL

CAIXA POSTAL 30.259  
01000 SÃO PAULO, SP.

LOIS MCKINNEY  
DIRETORA

5 de agosto de 1972

Prezadas amigas cooperadoras,

Muito obrigada pela sua prontidão em cooperar no Estudo Pedagógico Inter-Cultural!

Por vários motivos, estamos certos que a senhora não ficará arrependida desta sua cooperação.

Em primeiro lugar, através de uma verba da Fundação Ford, podemos prometer uma remuneração pela sua contribuição na pesquisa.

Em segundo lugar, a senhora receberá, gratis, os resultados dos testes de Inteligência Otis e muitos outros dados valiosos sobre os seus alunos.

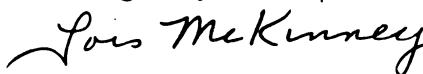
Uma terceira vantagem na sua cooperação--você receberá informação sobre a instrução programada e outros assuntos teóricos e práticos na pedagogia. Participar numa pesquisa é uma atividade bastante interessante.

Pedimos desculpas de antemão pelas pequenas interrupções e atrasos no seu programa que a pesquisa causará. Faremos todo possível para que isto aconteça o mínimo possível.

Junto com esta carta, a senhora encontrará uma descrição geral da pesquisa, e também uma descrição da cooperação que estamos pedindo.

Aguardando suas perguntas e observações (Telefone 269-1191), sou

Muito grata,



Lois (Loide) McKinney

promovido pela Associação Evangélica Teológica para Treinamento por Extensão

RICHARD STURZ, SECRETÁRIO-EXECUTIVO

**ESTUDO PEDAGÓGICO INTER-CULTURAL**

CAIXA POSTAL 30.259  
01000 SÃO PAULO, SP.

LOIS MCKINNEY  
DIRETORA

5 de agosto de 1972

**ÀS PROFESSORAS PARTICIPANTES NO ESTUDO PEDAGÓGICO INTER-CULTURAL,**

**BENVINDAS AO ESTUDO PEDAGÓGICO!**

Aguardando com muito prazer três semanas de convivência e trabalho com as senhoras professoras, pedimos a sua cooperação nas seguintes atividades:

- 1) Entregando-nos a palavra e a liderança nas suas aulas, para ensino e testes em grupo, nas datas seguintes:
 

4ª,	16 de agosto	10 minutos
5ª,	17 de agosto	tempo integral
5ª,	24 de agosto	tempo integral
5ª,	31 de agosto	15 minutos
3ª,	5 de setembro	30 minutos
  
- 2) Facilitando a participação dos alunos em testes e entrevistas particulares; dando licença para que eles se retirem da sala de aula, um de cada vez, nos dias seguintes:
 

4ª,	16 de agosto
6ª,	25 de agosto
2ª,	28 de agosto
3ª,	29 de agosto
6ª,	1 de setembro
2ª,	4 de setembro

As entrevistas e testes tem duração de 3 minutos para cada aluno. Faremos de tal maneira que a interrupção seja feita em ordem e assim a senhora poderá leccionar sem dificuldades nestes dias.

- 3) Não dando outra instrução ou leituras sobre a alimentação entre os dias 16 de agosto e 5 de setembro, nem ajudando os alunos com as matérias do cursinho sobre a nutrição. (Isto porque a pesquisa quer descobrir até que ponto a instrução programada ensina sem a ajuda duma professora, e sem outras materiais didáticas.)

**MUITO OBRIGADA PELA SUA COOPERAÇÃO!**

promovido pela Associação Evangélica Teológica para Treinamento por Extensão

RICHARD STURZ, SECRETÁRIO-EXECUTIVO

APPENDIX C

STUDENT RECORD BOOK





APPENDIX C

STUDENT RECORD BOOK

C A D E R N O

D E D A D O S

I N D I V I D U A I S

Nome do Aluno. \_\_\_\_\_

Número do Aluno \_\_\_\_\_

Grupo \_\_\_\_\_

Tratamento:

- 1- Expositivo - Individualizado
- 2- Expositivo - Grupo
- 3- Descoberta - Individualizado
- 4- Descoberta - Grupo

## APPENDIX C-1

2

DECK - 1  
CARTÃO - 1

Attendance Form

## FREQUÊNCIA

1ª Sessão

- C-10      4 - Presente  
          3 - Ausente-inevitável, provavelmente não devido a perda de interesse  
          2 - Ausente-pode ter sido ou não perda de interesse  
          1 - Ausente-evitável, única explicação plausível é falta de interesse  
          0 - Ausente-razão desconhecida

## Razões da ausência

relatadas por colega(s) \_\_\_\_\_

\_\_\_\_\_

relatadas pelo estudante \_\_\_\_\_

\_\_\_\_\_

2ª Sessão

- C-11      4 - Presente  
          3 - Ausente-inevitável, provavelmente não devido a perda de interesse  
          2 - Ausente-pode ter sido ou não perda de interesse  
          1 - Ausente-evitável, única explicação plausível é falta de interesse  
          0 - Ausente-razão desconhecida

## Razões da ausência

relatadas por colega(s) \_\_\_\_\_

\_\_\_\_\_

relatadas pelo estudante \_\_\_\_\_

\_\_\_\_\_

3ª Sessão

- C-12      4 - Presente  
          3 - Ausente-evitável, provavelmente não devido a perda de interesse  
          2 - Ausente-pode ter sido ou não perda de interesse  
          1 - Ausente-evitável, única explicação plausível é falta de interesse  
          0 - Ausente-razão desconhecida

## Razões da ausência

relatadas por colega(s) \_\_\_\_\_

\_\_\_\_\_

relatadas pelo estudante \_\_\_\_\_

\_\_\_\_\_

## APPENDIX C-2

Pretest (Oral)DECK 1CARTÃO 2PRÉ-TESTE E PÓS-TESTE  
(Parte Escrita)

- \_\_\_ No mínimo 2 alimentos do Grupo 1
- \_\_\_ No mínimo 3 alimentos do Grupo 2
- \_\_\_ No mínimo 4 alimentos do Grupo 3
- \_\_\_ No mínimo 4 alimentos do Grupo 4
- \_\_\_ Alimento Vitamina C: Legume verde, côr abóbora
- \_\_\_ TOTAL DA PARTE ESCRITA

C-10  
C-30  
C-50

PRÉ-TESTE E PÓS-TESTE  
(Parte Oral)

O NOME DO ALUNO ESTÁ NO TRABALHO ESCRITO?

FAÇA UM CÍRCULO EM TORNO DE UM ALIMENTO QUE APARECE NA LISTA DO ALUNO

C-11  
C-31  
C-51

- 1- leite
- 2- galinha
- 3- laranja
- 4- batata
- 5- arroz
- 6- macarrão
- 7- outro \_\_\_\_\_

→ "Será que você poderia mostrar onde escreveu \_\_\_\_\_, por favor, para que eu possa verificar sua escolha neste papel?"

C-12  
C-32  
C-52

- 0- Não pode mostrar a palavra
- 1- Pode mostrar a palavra

→ "Por que você escolheu \_\_\_\_\_?"

→ "Existem outras razões para você ter escolhido \_\_\_\_\_?"

VIRE A PÁGINA

DECK 1CARTÃO 2

## PRÉ-TESTE E PÓS-TESTE (continuação)

ANOTE AS RESPOSTAS ORAIS

Nenhuma RespostaPrazer

Gosto \_\_\_\_\_

C-13

C-33

C-53

Instrução: Particular do Cursinho

Faz parte do grupo que . . .

C-14

C-34

C-54

Preciso comê-lo \_\_\_\_\_ vezes . . .

Instrução: Geral

Tem vitamina

C-15

C-35

C-55

É aconselhado pelo médico \_\_\_\_\_

Raciocínio

Faz bem a saúde

C-16

C-36

C-56

Alimenta \_\_\_\_\_

Hábito

Aprendi a comê-lo

C-17

C-37

C-57

Sempre o como \_\_\_\_\_

Utilidade

Pode cozinhar com ele \_\_\_\_\_

C-18

C-38

C-58

Outras Respostas

C-19

C-39

C-59

VIRE A PÁGINA

C-20,21

C-40,41

C-60,61

TOTAL DAS COLUNAS 13-19, 33-39, 53-59

DECK 1  
CARTÃO 2

PRE-TESTE E PÓS-TESTE (Continuação)

Observações gerais

Privacidade -

- |      |  |
|------|--|
|      | 3 - Sozinho com o entrevistador.                 |
| C-12 | 2 - Outros presentes, observando tranquilamente. |
| C-22 | 1 - Outros presentes, distraído a atenção.       |
| C-32 | 0 - Nenhuma observação sobre o item.             |

Iluminação -

- |      |   |
|------|---|
|      | 3 - Boa iluminação, permitindo fácil leitura      |
| C-13 | 2 - Iluminação fraca, embora permitindo a leitura |
| C-23 | 1 - Má iluminação, leitura difícil                |
| C-33 | (ex: lâmpada a querosene)                         |
|      | 0 - Nenhuma observação sobre o item.              |

Afinidade (Rapport) com o entrevistador durante a entrevista foi  
(Julgamento feito pelo entrevistador)

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Bom                             |
| C-14 | 2 - Neutro                          |
| C-24 | 1 - Insuficiente                    |
| C-34 | 0 - Nenhuma observação sobre o item |

Julgamento do entrevistador sobre a ansiedade do entrevistado  
durante a entrevista.

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Calmo                           |
| C-15 | 2 - Neutro                          |
| C-25 | 1 - Ansioso                         |
| C-35 | 0 - Nenhuma observação sobre o item |

Comentários e observações :

TERME AQUI

QUESTIONARIO A

C-13                      0 - Feminino  
                             1 - Masculino

C-14,15 → "Qual a sua idade?"

→ "Quando você deixou de ir à escola, em que ano estava?"

C-16

0	-	Nunca fui à escola
1	-	12 ano primário
2	-	20 ano primário
3	-	30 ano primário
4	-	40 ano primário (primário completo)
5	-	50 ano primário (admissão)
6	-	60 ano primário

→ "Na(s) sua(s) escola(s) os alunos sentavam em fila ou em círculos?"

C-17

- 0 - Nenhuma resposta, não sabe
- 1 - Filas
- 2 - Ambas as coisas
- 3 - Círculos

→ "Os alunos ficavam sentados para responder às perguntas do professor ou tinham que se levantar?"

C-18

0	- Nenhuma resposta
1	- Levantavam-se
2	- Ora sim, ora não
3	- Permaneciam sentados

→ "Os alunos podiam se movimentar dentro da sala de aula sem pedir licença ou tinham que ficar sentados e quietos?"

C-19

- 0 - Nenhuma resposta
- 1 - Sentados e quietos
- 2 - Ambas as coisas
- 3 - Movimentavam-se à vontade

Deck 1  
Cartão 1

QUESTIONÁRIO A (Continuação)

Ocupação

- "Qual é o seu trabalho?" \_\_\_\_\_  
 (Se não está trabalhando) "Quem sustenta a casa?" \_\_\_\_\_
- "O que ~~ele~~ faz?" \_\_\_\_\_  
 (ou, o senhor)
- "Quem é seu patrão?" (ou dele) \_\_\_\_\_  
 \_\_\_\_\_  
 (o senhor)
- "Que é que ~~ele~~ faz no seu trabalho?" \_\_\_\_\_  
 \_\_\_\_\_  
 (o senhor)
- "Ele sempre faz isso ou algumas vezes faz outras coisas?" \_\_\_\_\_  
 \_\_\_\_\_

vire a pagina

CODIFICAÇÃO DE OCUPAÇÃO

Padrão Internacional de Classificação de Ocupações (ISCO)

C-20

- 0 - Trabalhadores não classificáveis
- 1 - Profissionais liberais e técnicos
- 2 - Administradores e gerentes
- 3 - Trabalho categorizado em escritórios
- 4 - Vendedores
- 5 - Pessoal de serviço
- 6 - Agricultores, lenhadores e pescadores
- 7 - Operários de produção, operadores de equipamento, trabalhador braçal

Escala Social de Hutchinson

C-21

- 0 - Não classificado
- 1 - Profissional liberal ou alta administração
- 2 - Gerência e execução
- 3 - Alta inspeção, supervisão e similares
- 4 - Baixa inspeção, supervisão e similares
- 5 - Trabalho manual qualificado
- 6 - Trabalho manual semi-qualificado e não qualificado

D ECK 1  
CARTÃO 1

QUESTIONÁRIO A (continuação)

Residência Rural ou Urbana e Migração

Residência Anterior

→ "Em qual estado você morou quando tinha dez anos?"

\_\_\_\_\_

→ "Você vivia no interior ou na cidade?"

\_\_\_\_\_

→ { (se no interior) "Como era o nome do lugar?"

\_\_\_\_\_

(se na cidade) "Como era o nome da cidade?"

\_\_\_\_\_

(se nos arredores de São Paulo) "Havia gente que morava lá e trabalhava na cidade de São Paulo?"

\_\_\_\_\_

VIRE A PAGINA

CODIFICAÇÃO DA RESIDÊNCIA ANTERIOR

Rural-Urbano (Cotejadas com o Anuário Estatístico)

- C-22 1 - Zona Rural  
2 - Zona Urbana (população igual ou superior a 10.000 habitantes)

Região

- C-23 0 - País Estrangeiro (Qual?) \_\_\_\_\_  
1 - Estado de São Paulo - capital e subúrbios  
2 - Estado de São Paulo - outras cidades  
3 - Estado de São Paulo - zona rural  
4 - Região Sul (Paraná, Santa Catarina, Rio Grande do Sul)  
5 - Região Leste (Bahia, Minas Gerais, Espírito Santo, Rio de J., Guanabara)  
6 - Região Centro-Oeste (Mato Grosso, Goiás, Distrito Federal)  
7 - Região Nordeste (Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Sergipe, Fernando de Noronha)  
8 - Meio Norte (Piauí, Maranhão)  
9 - Amazônia (Acre, Amazonas, Pará, Amapá, Roraima, Rondônia)



DECK I  
CARTÃO 1

QUESTIONÁRIO A (continuação)

Residência Rural ou Urbana e Migração (continuação)

Residência Atual

→ "Onde você mora agora? Em que estado?"

\_\_\_\_\_

→ "Você vive no interior ou na cidade?"

\_\_\_\_\_

→ { (se no interior) "Como é o nome do lugar?"

\_\_\_\_\_

→ { (se na cidade) "Como é o nome da cidade?"

\_\_\_\_\_

→ { (se nos arredores de São Paulo) "Há gente que mora lá e trabalha na cidade de São Paulo?"

\_\_\_\_\_

VIRE A PÁGINA

CODIFICAÇÃO DA RESIDÊNCIA ATUAL

Rural - Urbano (cotejadas com o Anuário Estatístico)

- C-24      0 - Zona Rural  
          1 - Zona Urbana (população igual ou superior a 10.000 habitantes)

Região

- C-25      0 - País estrangeiro (Qual?) \_\_\_\_\_  
          1 - Estado de São Paulo - capital e subúrbios  
          2 - Estado de São Paulo - outras cidades  
          3 - Estado de São Paulo - zona rural  
          4 - Região do Sul (Paraná, Santa Catarina, Rio Grande do Sul)  
          5 - Região Leste (Bahia, Minas Gerais, Espírito Santo, Rio de J., Guanabara)  
          6 - Região Centro-Oeste (Mato Grosso, Goiás, Distrito Federal)  
          7 - Região Nordeste (Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Sergipe, Fernando de Noronha)  
          8 - Meio Norte (Piauí, Maranhão)  
          9 - Amazônia (Acre, Amazonas, Pará, Amapá, Roraima, Rondônia)

DECK 1  
 CARTÃO 1

QUESTIONÁRIO A (continuação)

Estabilidade de Residência

→ "Há quanto tempo o senhor mora aqui?"

C-26

- 0 - menos de um ano
- 1 - um ano e menos de dois
- 2 - dois anos e menos de três
- 3 - três anos e menos de quatro
- 4 - quatro anos e menos de cinco
- 5 - cinco anos e menos de seis
- 6 - seis anos e menos de sete
- 7 - sete anos e menos de oito
- 8 - oito anos e menos de nove
- 9 - nove anos ou mais (Quanto tempo?)

continuar em baixo

CODIFICAÇÃO DA DIREÇÃO DA MOBILIDADE

Direção da Mobilidade

C-27

- 1 - Sempre viveu na zona rural
- 2 - De uma zona rural para outra
- 3 - De zona urbana para zona rural
- 4 - De zona rural para zona urbana
- 5 - De uma zona urbana para outra
- 6 - Sempre viveu na zona urbana (cidade e subúrbios)

continuar aqui

Religião



"Você ( o senhor ) vai à Igreja?"

(se vai) "Quantas vezes?"

C-28

- 0 - Não
- 1 - Algumas vezes durante o ano
- 2 - Mais ou menos uma vez por mês
- 3 - Duas ou três vezes por mês
- 4 - Toda semana, aos domingos
- 5 - Todos os domingos, e também durante a semana



"Qual é a sua religião?" (Ou, "Qual a sua Igreja?")

C-29

- 1 - Evangélica (Protestante)
- 2 - Católica
- 3 - Espirita
- 4 - Outra (Qual?)
- 5 - Nenhuma

DECK 1  
CARTÃO 1

## APPENDIX C-4

## QUESTIONÁRIO B

(Escala de Modernidade Smith-Inkeles)

→ "Por ventura você já ficou bastante preocupado a respeito de certo problema público, tal como desemprego, que se sentiu movido a fazer algo sobre o mesmo?"

C - 30

- 3 - Frequentemente
- 2 - Algumas vezes
- 1 - Nunca
- 0 - Nenhuma resposta

→ "Se não há nada que impeça, por quantos anos o senhor acha que os seus filhos devem ir à escola?"  
(ou, "... que crianças devem ir à escola?)

C - 31

- 3 - Nível superior
- 2 - Nível médio
- 1 - Nível primário
- 0 - Nenhuma resposta

→ "Dois meninos trabalhavam, como camelôs, e pararam o trabalho para procurar uma maneira de vender mais em menos tempo (horas) de trabalho".

"O pai de um dos meninos disse: "É bom a gente pensar sobre isso. Conte como devemos fazer para vender mais em menos horas de trabalho".

"O pai do outro menino disse: "A maneira de vender é como você sempre vendeu. Procurar outra maneira é perder tempo".

"Qual destes pais tinha razão?"

C - 32

- 3 - Aquele que disse, "É bom pensar..."
- 1 - Aquele que disse, "Procurar outra maneira é perder tempo."
- 0 - Nenhuma resposta

→ "O que é que um homem mais precisa ter, para alcançar um cargo importante?"

C - 33

- 3 - Ter muito estudo e saber fazer o trabalho
- 2 - Ser querido pelos outros
- 1 - Respeitar os velhos costumes
- 1 - Ser de família importante
- 0 - Nenhuma resposta

→ "O que você acha que é mais importante para o futuro do Brasil?"

C - 34

- 3 - Planejamento do governo
- 2 - O povo trabalhar muito
- 1 - Boa sorte
- 0 - Nenhuma resposta

DECK 1  
CARTÃO 1

## QUESTIONÁRIO B (continuação)

---

→ "Os cientistas, nas universidades, estão estudando assuntos como o que determina se uma criança que está para nascer será "menino" ou "menina" e também como é que uma semente pode tornar-se numa planta. O senhor acha que êsses estudos são:

- C - 35
- 3 - Todos úteis
  - 2 - Têm alguma coisa de útil
  - 2 - Têm alguma coisa de prejudicial
  - 1 - Todos muito prejudiciais
  - 0 - Nenhuma resposta

---

→ "Qual o número ideal de filhos para uma pessoa como o senhor?" (ou, ...para uma família?"

- C - 36
- 3 - Nenhum, um, dois
  - 2 - Três ou quatro
  - 1 - Cinco ou mais
  - 0 - Nenhuma resposta

---

→ "Qual dos seguintes tipos de notícias lhe interessa mais?"

- C - 37
- 3 - Acontecimentos no estrangeiro
  - 2 - Acontecimentos no Brasil
  - 1 - Acontecimentos na sua cidade
  - 0 - Nenhuma resposta

---

→ "Se o senhor conhecer uma pessoa que vive num país estrangeiro, muito distante, o senhor acha que entenderá a maneira de pensar dessa pessoa?"

- C - 38
- 3 - Sim
  - 1 - Não
  - 0 - Nenhuma resposta

---

→ "O que é mais importante para uma pessoa doente, cuidados médicos, ou orações?"

- C - 39
- 3 - Cuidados médicos
  - 2 - Ambas as coisas
  - 1 - Orações
  - 0 - Nenhuma resposta

DECK 1

CARTÃO 1

## QUESTIONÁRIO B (continuação)

→ "Quais são na sua opinião os maiores problemas do Brasil atualmente?"

---



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---



---



---



---

CONTINUE EM BAIXO

C - 40

- 3 - Citou três ou mais problemas
- 2 - Citou um ou dois problemas
- 1 - Não citou nenhum problema
- 0 - Nenhuma resposta

CONTINUE AQUI

→ "Em que país fica a cidade de Washington?"

C - 41

- 3 - EE.UU.
- 1 - Resposta errada, não sabe
- 0 - Nenhuma resposta

"Quantas vezes você costuma lêr o jornal?"

C - 42

- 3 - Todos os dias
- 2 - Algumas vezes
- 1 - Nunca
- 0 - Nenhuma resposta

FIM - QUESTIONÁRIO B

TOTAL - ESCALA DE MODERNIDADE (Itens 30 - 42)

C - 43,44

## APPENDIX C-5

DECK 1CARTÃO 2PosttestPRÉ-TESTE E PÓS-TESTE  
(Parte Escrita)

- \_\_\_ No mínimo 2 alimentos do Grupo 1
- \_\_\_ No mínimo 3 alimentos do Grupo 2
- \_\_\_ No mínimo 4 alimentos do Grupo 3
- \_\_\_ No mínimo 4 alimentos do Grupo 4
- \_\_\_ Alimento Vitamina C: Legume verde, côr abóbora
- \_\_\_ TOTAL DA PARTE ESCRITA

C-10  
C-30  
C-50

PRÉ-TESTE E PÓS-TESTE  
(Parte Oral)

O NOME DO ALUNO ESTÁ NO TRABALHO ESCRITO?

FAÇA UM CÍRCULO EM TORNO DUM ALIMENTO QUE APARECE NA LISTA DO ALUNO

C-11  
C-31  
C-51

- 1- leite
- 2- galinha
- 3- laranja
- 4- batata
- 5- arroz
- 6- macarrão
- 7- outro \_\_\_\_\_

→ "Será que você poderia mostrar onde escreveu \_\_\_\_\_, por favor, para que eu possa verificar sua escolha neste papel?"

C-12  
C-32  
C-52

- 0- Não pode mostrar a palavra
- 1- Pode mostrar a palavra

→ "Por que você escolheu \_\_\_\_\_?"

→ "Existem outras razões para você ter escolhido \_\_\_\_\_?"

VIR A PÁGINA

DECK 1CARTÃO 2

PRE-TESTE E PÓS-TESTE (continuação)

ANOTE AS RESPOSTAS ORAIS
--------------------------

Nenhuma RespostaPrazer

Gosto \_\_\_\_\_

C-13

C-33

C-53

Instrução: Particular do Cursinho

Faz parte do grupo que . . .

Preciso comê-lo \_\_\_\_\_ vezes . . .

C-14

C-34

C-54

Instrução: Geral

Tem vitamina

É aconselhado pelo médico \_\_\_\_\_

C-15

C-35

C-55

Raclocínio

Faz bem a saúde

Alimenta \_\_\_\_\_

C-16

C-36

C-56

Hábito

Aprendi a comê-lo

Sempre o como \_\_\_\_\_

C-17

C-37

C-57

Utilidade

Pode cozinhar com ele \_\_\_\_\_

C-18

C-38

C-58

Outras Respostas

C-19

C-39

C-59

VIRE A PÁGINA
---------------

C-20,21  
C-40,41  
C-60,61

TOTAL DAS COLUNAS 13-19, 33-39, 53-59

DECK 1  
 CARTÃO 2

PRE-TESTE E PÓS-TESTE (Continuação)

Observações gerais

Privacidade -

- |      |  |
|------|--|
|      | 3 - Sozinho com o entrevistador.                 |
| C-12 | 2 - Outros presentes, observando tranquilamente. |
| C-22 | 1 - Outros presentes, distraído a atenção.       |
| C-32 | 0 - Nenhuma observação sobre o item.             |

Iluminação -

- |      |   |
|------|---|
|      | 3 - Boa iluminação, permitindo fácil leitura      |
| C-13 | 2 - Iluminação fraca, embora permitindo a leitura |
| C-23 | 1 - Má iluminação, leitura difícil                |
| C-33 | (ex: lâmpada a querosene)                         |
|      | 0 - Nenhuma observação sobre o item.              |

Afinidade (Rapport) com o entrevistador durante a entrevista foi  
 (Julgamento feito pelo entrevistador)

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Bom                             |
| C-14 | 2 - Neutro                          |
| C-24 | 1 - Insuficiente                    |
| C-34 | 0 - Nenhuma observação sobre o item |

Julgamento do entrevistador sobre a ansiedade do entrevistado  
durante a entrevista .

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Calmo                           |
| C-15 | 2 - Neutro                          |
| C-25 | 1 - Ansioso                         |
| C-35 | 0 - Nenhuma observação sobre o item |

Comentários e observações :

TERME AQUI



## APPENDIX C-6

Delayed PosttestDECK 1CARTÃO 2PRÉ-TESTE E PÓS-TESTE  
(Parte Escrita)

- \_\_\_ No mínimo 2 alimentos do Grupo 1
- \_\_\_ No mínimo 3 alimentos do Grupo 2
- \_\_\_ No mínimo 4 alimentos do Grupo 3
- \_\_\_ No mínimo 4 alimentos do Grupo 4
- \_\_\_ Alimento Vitamina C: Legume verde, côr abóbora
- \_\_\_ TOTAL DA PARTE ESCRITA

C-10  
C-30  
C-50

PRÉ-TESTE E PÓS-TESTE  
(Parte Oral)

O NOME DO ALUNO ESTÁ NO TRABALHO ESCRITO?

FAÇA UM CÍRCULO EM TORNO DUM ALIMENTO QUE APARECE NA LISTA DO ALUNO

C-11  
C-31  
C-51

- 1- leite
- 2- galinha
- 3- laranja
- 4- batata
- 5- arroz
- 6- macarrão
- 7- outro \_\_\_\_\_

→ "Será que você poderia mostrar onde escreveu \_\_\_\_\_, por favor, para que eu possa verificar sua escolha neste papel?"

C-12  
C-32  
C-52

- 0- Não pode mostrar a palavra
- 1- Pode mostrar a palavra

→ "Por que você escolheu \_\_\_\_\_?"

→ "Existem outras razões para você ter escolhido \_\_\_\_\_?"

VIR A PÁGINA

DECK 1CARTÃO 2

PRÉ-TESTE E PÓS-TESTE (continuação)

ANOTE AS RESPOSTAS ORAIS
--------------------------

Nenhuma RespostaPrazer

Gosto \_\_\_\_\_

C-13

C-33

C-53

Instrução: Particular do Cursinho

Faz parte do grupo que . . .

C-14

C-34

C-54

Preciso comê-lo \_\_\_\_\_ vezes . . . \_\_\_\_\_

Instrução: Geral

Tem vitamina

C-15

C-35

C-55

É aconselhado pelo médico \_\_\_\_\_

Raciocínio

Faz bem a saúde

C-16

C-36

C-56

Alimenta \_\_\_\_\_

Hábito

Aprendi a comê-lo

C-17

C-37

C-57

Sempre o como \_\_\_\_\_

Utilidade

Pode cozinhar com ele \_\_\_\_\_

C-18

C-38

C-58

Outras Respostas

C-19

C-39

C-59

VIRE A PÁGINA
---------------

C-20,21

C-40,41

C-60,61

TOTAL DAS COLUNAS 13-19, 33-39, 53-59

DECK 1  
 CARTÃO 2

PRE-TESTE E PÓS-TESTE (Continuação)

Observações gerais

Privacidade -

- |      |  |
|------|--|
|      | 3 - Sozinho com o entrevistador.                 |
| C-12 | 2 - Outros presentes, observando tranquilamente. |
| C-22 | 1 - Outros presentes, distraído a atenção.       |
| C-32 | 0 - Nenhuma observação sobre o item.             |

Iluminação -

- |      |   |
|------|---|
|      | 3 - Boa iluminação, permitindo fácil leitura      |
| C-13 | 2 - Iluminação fraca, embora permitindo a leitura |
| C-23 | 1 - Má iluminação, leitura difícil                |
| C-33 | (ex: lâmpada a querosene)                         |
|      | 0 - Nenhuma observação sobre o item.              |

Afinidade (Rapport) com o entrevistador durante a entrevista foi  
(Julgamento feito pelo entrevistador)

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Bom                             |
| C-14 | 2 - Neutro                          |
| C-24 | 1 - Insuficiente                    |
| C-34 | 0 - Nenhuma observação sobre o item |

Julgamento do entrevistador sobre a ansiedade do entrevistado  
durante a entrevista.

- |      |                                     |
|------|-------------------------------------|
|      | 3 - Calmo                           |
| C-15 | 2 - Neutro                          |
| C-25 | 1 - Ansioso                         |
| C-35 | 0 - Nenhuma observação sobre o item |

Comentários e observações :

TERME AQUI

## APPENDIX C-7

Instrument for Choosing PI  
or Story Method

DECK 1

CARTÃO 1

## ESCOLHA DA INSTRUÇÃO PROGRAMADA

"Gostaríamos de dar a você um exemplar da 4ª Lição, de modo que você possa ensinar um amigo. Você pode escolher entre dois estilos; um é em instrução programada, do mesmo jeito que você estudou neste curso. O outro diz as mesmas coisas, e é escrito como uma história. Todos dois tem os mesmos ensinamentos. A única diferença é que um é história (mostra o livro) e o outro é instrução programada (mostra o livro) como você acabou de estudar. Qual dos dois você acharia melhor levar? (Mostra os dois livros) o de instrução programada (mostra o livro) ou a história (mostra o livro)?"

C-45

- 0 - Nenhuma escolha ou escolha ambígua
- 1 - História
- 2 - Instrução programada

## APPENDIX C-8

DECK 1

CARTÃO 1

## QUESTIONÁRIO C

Informações sobre a Nutrição de Outras Fontes

→ "Durante estas três semanas de aulas, você escutou alguma coisa no rádio que lhe fez lembrar do nosso cursinho?"

- C-50            0 - Não, não me lembro  
                 2 - Sim  
                 ("O que escutou?")
- \_\_\_\_\_
- \_\_\_\_\_

→ "Durante estas três semanas de aulas, você viu alguma coisa na televisão que lhe fez lembrar do nosso cursinho?"

- C-51            0 - Não, não me lembro  
                 2 - Sim  
                 ("O que viu?")
- \_\_\_\_\_
- \_\_\_\_\_

→ "Durante estas três semanas de aulas, você leu alguma coisa em revistas, jornais, ou livros que lhe fez lembrar do nosso cursinho?"

- C-52            0 - Não, não me lembro  
                 2 - Sim  
                 ("O que leu?")
- \_\_\_\_\_
- \_\_\_\_\_

→ "Durante estas três semanas de aulas você conversou com outras pessoas sobre a alimentação?"

- C-53            0 - Não, não me lembro  
                 1 - Um pouco  
                 2 - Muito

DECK 1

CARTÃO 1

## QUESTIONÁRIO C (continuação)

→ "Durante estas três semanas de aulas você assistiu outros cursos ou reuniões onde discutiram alimentação?"

- C-54                    0 - Não, não me lembro  
                          2 - Sim  
                          ("O que assistiu?")

\_\_\_\_\_

\_\_\_\_\_

Locomoção para as aulas

→ "Quanto tempo levava para chegar na aula?"

- C-55                    0 - Nenhuma resposta  
                          1 - 15 minutos ou menos  
                          2 - Mais ou menos 30 minutos  
                          3 - Mais ou menos 45 minutos  
                          4 - Uma hora ou mais

→ "Como Você chegava na aula?"

- C-56                    0 - Nenhuma resposta  
                          1 - Andando a pé  
                          2 - De bicicleta  
                          3 - De ônibus  
                          4 - De taxi ou carro  
                          5 - Outros ("Quais?" \_\_\_\_\_)

Conhecimento da IP

→ "Antes de assistir estas aulas, o senhor conheceu esta maneira de ensinar, ou era uma novidade?"

- C-57                    0 - Nenhuma resposta  
                          1 - Era novidade  
                          2 - Já conheceu?  
                          ("Como?")

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DECK 1

CARTÃO 1

## QUESTIONÁRIO C (continuação)

Trabalho a Sós ou em Grupo

→ "Quando você fez as lições de casa, fez sozinho, ou com outras pessoas?"

C-58

- 3 - Trabalhou com outros
- 2 - Ora sim, ora não
- 1 - Trabalhou sozinho
- 0 - Nenhuma resposta

## **APPENDIX D**

### **EXERCISES AND TESTS**



# APPENDIX D-1

Número \_\_\_\_\_

## Pretest-Posttest-Delayed Posttest (Written)

Nome \_\_\_\_\_

Grupo \_\_\_\_\_

### PLANEJANDO UMA DIETA

Aquí está uma lista de alimentos.

Se você quer ter uma dieta adequada, que comidas comerá amanhã?

Você pode fazer 13 (treze) escolhas entre esses alimentos.

Vá escrevendo-os, um depois do outro, nos espaços em branco, na ordem da escolha.

Lembra-se que você quer uma alimentação boa. Não corra.

Planeje bem a sua dieta.

Quando terminar, leve a sua lista ao professor.

leite  
queijo  
pudim  
mingau  
papa  
coalhada

galinha  
pombo  
pato

sardinha  
pescada  
talinha  
bacalhau

bol  
porco  
carneiro

fígado  
coração

ovos  
feijão

laranja  
limão  
mamão

abóbora  
cenoura  
espinafre

banana  
maçã  
abacaxi  
batata

macarrão  
arroz  
milho  
aveia  
farinha de trigo  
farinha de mandioca

gorduras  
doces

1. \_\_\_\_\_

8. \_\_\_\_\_

2. \_\_\_\_\_

9. \_\_\_\_\_

3. \_\_\_\_\_

10. \_\_\_\_\_

4. \_\_\_\_\_

11. \_\_\_\_\_

5. \_\_\_\_\_

12. \_\_\_\_\_

6. \_\_\_\_\_

13. \_\_\_\_\_

7. \_\_\_\_\_

## APPENDIX D-2

Exercise 1

Número \_\_\_\_\_

Nome \_\_\_\_\_

Grupo \_\_\_\_\_

## EXERCÍCIO 1

Escreva o grupo de alimentos, ao qual cada um pertence.

Exemplo: A galinha pertence ao grupo de alimentos que fortalecem.

1. O pudim pertence ao grupo de alimentos com \_\_\_\_\_
2. O carneiro pertence ao grupo de alimentos que \_\_\_\_\_
3. A laranja pertence ao grupo de alimentos que \_\_\_\_\_
4. Os doces pertencem ao grupo de alimentos que \_\_\_\_\_
5. A abóbora pertence ao grupo de alimentos que \_\_\_\_\_
6. O queijo pertence ao grupo de alimentos com \_\_\_\_\_
7. Os ovos pertencem ao grupo de alimentos que \_\_\_\_\_
8. O macarrão pertence ao grupo de alimentos que \_\_\_\_\_

## APPENDIX D-3

Exercise 2

Número \_\_\_\_\_

Nome \_\_\_\_\_

Grupo \_\_\_\_\_

## EXERCÍCIO 2

Preencha os espaços em branco com o número certo.

Todos os dias,

os adultos precisam comer:

alimentos com leite \_\_\_\_\_ vezes;

alimentos que fortalecem \_\_\_\_\_ vezes;

alimentos que protegem \_\_\_\_\_ vezes.

alimentos que dão energia \_\_\_\_\_ vezes.

**APPENDIX E**

**SESSION OBSERVATION FORM**

APPENDIX E

SESSION OBSERVATION FORM

DECK 2

CARTÃO 1

FORMULÁRIO DE OBSERVAÇÃO DAS AULAS

Grupo

C-1,2 \_\_\_\_\_

Lugar

\_\_\_\_\_

Data

C-3,4 Dia \_\_\_\_\_

C-5,6 Mês \_\_\_\_\_

Dia da Semana

C-7  
1 - Domingo  
2 - Segunda  
3 - Terça  
4 - Quarta  
5 - Quinta  
6 - Sexta  
7 - Sábado

Turno

C-8  
1 - Matutino  
2 - Vespertino  
3 - Noturno

Tratamento

C-9  
1 - Expositivo-Individualizado  
2 - Expositivo-Grupo  
3 - Descoberta-Individualizado  
4 - Descoberta-Grupo

Relativo a

C-10  
1 - Primeira semana  
2 - Segunda semana  
3 - Terceira semana

DECK 2

CARTÃO 1

## FORMULÁRIO DE OBSERVAÇÃO DAS AULAS (continuação)

Frequência

C-11,12	Participando
	_____
	Não participando
C-13,14	_____
	Coordinadores
C-15	_____
	Professores
C-16	_____

Iluminação

C-17	3 - Boa (fácil leitura)
	2 - Fraca (necessário ler com certo esforço)
	1 - Má (ex - lâmpadas a querosene)
	0 - Nenhuma observação quanto ao item

Ventilação

C-18	3 - Boa
	2 - Alguma
	1 - Nenhuma
	0 - Nenhuma observação

Temperatura

C-19	3 - Agradável
	1 - Quente
	1 - Fria
	0 - Nenhuma observação

Tempo

C-20	3 - Claro
	1 - Chuvoso
	0 - Nenhuma observação

DECK 2

CARTÃO 1

## FORMULÁRIO DE OBSERVAÇÃO DAS AULAS (continuação)

Aspetto dos arredores da classe

- C-21            3 - Agradável e limpo  
              2 - Normal  
              1 - Desagradável e sujo  
              0 - Nenhuma observação

Espaço físico

- C-22            3 - Bastante amplo  
              2 - Um pouco exíguo, ainda sem dificultar o trabalho  
              1 - Insuficiente, prejudicando o trabalho  
              0 - Nenhuma observação quanto ao item

Mobiliário disponível

- C-23            3 - Mesa e cadeiras apropriadas  
              2 - Foi feita alguma improvisação, sem prejudicar o rendimento do trabalho  
              1 - Foram feitas improvisações que prejudicaram o rendimento do trabalho  
              0 - Nenhuma observação

Interrupções, barulho, confusão

- C-24            3 - Ambiente sem interrupções, sem barulho, sem confusão  
              2 - Algumas interrupções, algum barulho, alguma confusão  
              1 - Muitas interrupções, muito barulho, muita confusão  
              0 - Nenhuma observação quanto ao item

Colaboração de lideranças locais

- C-25            3 - Cooperativas  
              2 - Mais ou menos cooperativas  
              1 - Não cooperativas  
              0 - Nenhuma observação quanto ao item

DECK 2

CARTÃO 1

## FORMULÁRIO DE OBSERVAÇÃO DAS AULAS (continuação)

Responsabilidades dos Monitores

## Distribuindo e Colecionando Matérias

- C-26
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

## Encaminhando Os Alunos para uma Atividade para a Outra

- C-27
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

## Dando Pré-Teste ou Pós-Teste Oral

- C-28
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

## Er+ revistando

- C-29
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

## Instruções sobre a IP

- C-30
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

## Administando Teste sobre a Inteligência

- C-31
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)



DECK 2

CARTÃO 1

## FORMULÁRIO DE OBSERVAÇÃO DAS AULAS (continuação)

Outra Responsabilidade (Qual?) \_\_\_\_\_

- C-32
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

Outra Responsabilidade (Qual?) \_\_\_\_\_

- C-33
- 1 - Loide
  - 2 - Helena
  - 3 - Hitoshi
  - 4 - Waldemur
  - 5 - Líder local
  - 6 - Outra pessoa (Quem? \_\_\_\_\_)

OBSERVAÇÕES SOBRE VARIAÇÕES EM PROCEDIMENTOS, FATORES HUMANOS, ETC.:

DECK 2

CARTÃO 1

FORMULÁRIO DE OBSERVAÇÃO DAS AULAS (continuação)

OBSERVAÇÕES:

## **APPENDIX F**

### **THE PROGRAMMED NUTRITION UNIT: EXPOSITORY VERSION**

Nome \_\_\_\_\_

Número \_\_\_\_\_ C - 1, 2, 3

Grupo \_\_\_\_\_ C - 4, 5

Lição \_\_\_\_\_ C - 6, 7

## A NOSSA COMIDA

### 4ª Lição

#### Por Que Nós Comemos?

1

Antônio, José, João, e Fernando  
estavam falando sobre os motivos porque  
comemos.

Cada um dos \_\_\_\_\_ homens deu  
(numero)  
uma razão diferente. Todas as \_\_\_\_\_  
(numero)  
razões estavam certas.

4-E

2

quatro  
quatro

"Nós comemos por uma razão importante,"  
disse Fernando.

"Sem alimento, eu morreria. Eu como  
para não morrer."

"Eu como para \_\_\_\_\_."

4-E

Note: This programmed unit is available (in Portuguese) through the Institute for  
International Studies in Education, Michigan State University

3

Fernando disse que ele come para viver. Ele estava certo.

viver

Todos os seres vivos precisam de comida para viver.

Se eles ficassem sem alimento por muito tempo, eles \_\_\_\_\_.

4-E

4

morreriam

Sem alimento, as pessoas morreriam.

Elas precisam de alimento para

\_\_\_\_\_.

4-E

5

viver

Para viver, as pessoas precisam de \_\_\_\_\_.

4-E

**APPENDIX G**

**THE PROGRAMMED NUTRITION UNIT:**

**DISCOVERY VERSION**

Nome \_\_\_\_\_  
\_\_\_\_\_  
Número \_\_\_\_\_ C-1,2,3  
Grupo \_\_\_\_\_ C - 4,5  
Lição \_\_\_\_\_ C - 6,7

## A NOSSA COMIDA

### 4ª Lição

Por Que Nós Comemos?

1

Para começar esta lição abra a  
folha que está na última página.

Você encontra o Exercício \_\_\_\_\_  
(numero).

4-D

2

quatro

Em cima do Exercício, você lê:

"RAZÕES PORQUE NÓS \_\_\_\_\_."

4-D

Note: This programmed unit is available (in Portuguese) through the Institute  
for International Studies in Education, Michigan State University.

3

Por que você come?

comemos

Pense na melhor razão porque você  
come.

Quando você pensar numa razão,  
vire a página.

4-D

4

Olhe o Exercício 4.

Continue  
a lição.

Escreva sua razão para comer no  
primeiro espaço em branco.

Depois, vire a página.

4-D

5

Continue  
a lição.

Pergunte a alguém porque ele come.

Escreva a razão dêle aqui:

---

4-D



## **APPENDIX H**

### **A COMPARISON OF TEACHING METHODS IN THE TWO PROGRAMMED NUTRITION UNITS**

## APPENDIX H

### A COMPARISON OF TEACHING METHODS IN THE TWO PROGRAMMED NUTRITION UNITS

#### NUTRITION UNIT: LESSON I FOODS AND THEIR JOBS

##### A Description of the Two Teaching Methods

###### Discovery Program:

###### Introduction

Student examines the food cards he will use in the lesson. He is then introduced to the food chart.

###### Sequent 1.

For each classification in the food chart, student

1. finds food cards which belong to the category (such as meats, vegetables)

2. lists the foods on the chart.

3. adds to the chart other foods he can think of that are in the same category

###### Sequence 2.

Summary and transition same in both versions.

###### Sequence 3.

Student uses food cards for a self-directed drill in assigning foods to the right group.

###### Expository Program:

###### Introduction and Sequence 1.

Student walked through food chart systematically. Must refer to chart in order to make responses.

###### Sequence 2.

Summary and transition. Same in both versions.

###### Sequence 3.

In a closely guided drill, students assign foods to food groups, referring to chart as needed.

## NUTRITION UNIT: LESSON II

## AN ADEQUATE DIET

A Description of the Two  
Teaching MethodsDiscovery Program:

Student compares an adequate and inadequate diet:

1. Globally (Sequence 1)

Finding at least one way in which the diets are alike.

Finding at least one way in which the diets are different.

2. Analytically (Sequence 2)

Finding what and how many foods from each group were in each diet.

Deciding which diet was the most adequate (in servings of foods from each group).

Completing statement of principles (adding the number of servings of foods from each group which are needed in an adequate daily diet).

3. Synthetically (Sequences 3,4)

Discovering that one diet was varied more than the other.

Creating a rule: We should vary our diet as much as possible.

Making generalized comparison of the two diets.

Arriving at principle that: An adequate daily diet includes enough foods from each food group;

- 2 servings of milk
- 3 " " foods which build
- 4 " " foods which protect
- 4 " " foods which give energy

Expository Program:1. General Principle Introduced  
(Sequence 1)

An adequate daily diet includes enough foods from each food group.

2. Positive Example (Sequence 2)

Student led through an analysis of an adequate diet:

identifies food groups to which foods belong; compares number of servings of foods in example with the number of foods specified in the food chart

3. Recall Drill (Sequence 3)

Given lists of food groups in scrambled order, student writes number of servings of each food which are needed in an adequate diet.

4. Negative Example (Sequence 4)

Student finds deficiencies in an inadequate diet by:

- a. identifying and counting foods from each group.
- b. comparing totals with daily requirement.
- c. deciding how many more servings needed for an adequate diet.
- d. observing that the diet was not as varied as it should be.

5. Summary (Sequence 5)

Review of principles of adequate diet.

## NUTRITION UNIT: LESSON III

## PLANNING A DIET

A Description of the Two  
Teaching MethodsDiscovery Program:Introduction

Same as expository.

Sequence 1.

Student plans an adequate diet without guidance. Writes all the foods he would like to eat in one day in blanks on the food chart.

Sequence 2.

Student analyzes the diet he planned above, making corrections and additions where necessary.

Sequence 3.

Student double checks his work; this time in a much more global way.

Sequence 4. Transition.

Student can opt for more practice, or can end the lesson here.

Sequences 5, 6.

Student plans and checks diet again with more help than he received above, but with less help than the expository version group.

Sequence 7.

Student chooses whether to end the lesson, or to repeat Sequences 5, 6.

Expository Program:Introduction

Student finds food chart with blanks to fill in.

Sequence 1.

Student guided step-by-step as he plans an adequate diet for one day.

Sequence 2. Review

Student looks at what he did in Sequence 1.

Sequence 3. Recall

Student recalls

1. number of servings of food he needs from each group.
2. specific foods he needs from each group.

## NUTRITION UNIT: LESSON IV

## WHY DO WE EAT

A Description of the Two  
Teaching MethodsDiscovery Program:

Sequence 1. Completing a List of Reasons We Eat

- 1.a Student writes his own reason for eating.
- 1.b Student asks three other persons their reasons for eating. Adds new reasons to the list.
- 1.c Student compares the list he has made with reasons given in the lesson. Adds to his list as necessary
- 1.d Student adds any other reasons he can think of to the list, and deletes any reasons he doesn't like.

Sequence 2. Egrul Exercise

Given a series of concepts and examples, the student decides which rule (i.e., reason) fits them best.

Sequence 3. Practice (to aid recall)

Student re-reads list of reasons; thinks about them.

Tries to recall them orally.

Notes in writing the reasons he had difficulty remembering.

Continues until he can recall all of the reasons.

Expository Program:

Sequences 1-4. Exposition of four reasons for eating through explanations and illustrations.

Sequences 5, 6. Practice and Review

Student performs two tasks:

When three reasons are given (scrambled order), he adds one.

When one reason is given, he adds three.

Terminal Frame. Student writes all the reasons he can for eating food.

Repeats sequences 5 and 6 as necessary.

## **APPENDIX I**

### **A COMPARISON OF THE READING DIFFICULTY OF TWO PROGRAMMED NUTRITION UNITS**

APPENDIX I

A COMPARISON OF THE READING DIFFICULTY

OF TWO PROGRAMMED NUTRITION UNITS

100-Word Samples	Number of Sentences		Number of Unfamiliar Words	
	Expository	Discovery	Expository	Discovery
<u>Lesson 1</u>				
Beginning	14	16	2	4
Middle	12	12	1	3
End	13	13	1	2
<u>Lesson 2</u>				
Beginning	9	12	3	3
Early	13	14	3	2
Middle	15	12	4	2
Late	12	12	1	4
End	12	14	1	4
<u>Lesson 3</u>				
Beginning	13	10	3	3
Middle	13	10	3	0
End	15	13	0	3
<u>Lesson 4</u>				
Beginning	14	14	0	0
Middle	10	14	1	3
End	10	13	0	2
Mean	12.5	12.8	1.6	2.5

**APPENDIX J**

**CERTIFICATE GRANTED FOR  
COMPLETION OF COURSE**



# ESTUDO PEDAGÓGICO INTER-CULTURAL

Caixa Postal 30259

SÃO PAULO

## CERTIFICADO

*Certifico que*

\_\_\_\_\_ frequentou o

*Cursinho de Nutrição promovido pelo "ESTUDO PEDAGÓGICO INTER-CULTURAL".*

São Paulo, \_\_\_\_\_ de \_\_\_\_\_ de 1972

\_\_\_\_\_  
*Professor*

\_\_\_\_\_  
*Diretora*

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