SADDAM, Alma Montano, 1938-
THE EFFECTS OF THREE INSTRUCTIONAL APPROACHES
ON KNOWLEDGE GAIN AND ATTITUDE CHANGE OF
PARAPROFESSIONALS IN THE EXPANDED FOOD AND
NUTRITION EDUCATION PROGRAM.

The Ohio State University, Ph.D., 1977
Education, adult

University Microfilms International, Ann Arbor, Michigan 48106

© Copyright by
Alma Montano Saddam
1977
THE EFFECTS OF THREE INSTRUCTIONAL APPROACHES ON KNOWLEDGE GAIN
AND ATTITUDE CHANGE OF PARAPROFESSIONALS IN THE EXPANDED
FOOD AND NUTRITION EDUCATION PROGRAM

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Alma Montano Saddam, B.S.H.E., M.Sc.

* * * * *

The Ohio State University

1977

Reading Committee:  
William D. Dowling, Ph.D.  
David L. Boggs, Ph.D.  
Clarence J. Cunningham, Ph.D.  
Anita R. McCormick, Ed.D.

Approved By

William D. Dowling
Adviser
Faculty of Vocational-Technical Education
To Tom, Mike, Malee, and Leigh Ann —
that you may be inspired to a
lifetime of learning.
ACKNOWLEDGMENT

This scholarly achievement is a result of the genuine cooperation, guidance and support of dedicated individuals, cherished colleagues and friends. I want to thank them for providing unique learning opportunities during this meaningful and most worthwhile educational experience.

Dr. David L. Boggs provided invaluable guidance and ideas throughout the preparation, design and conduct of the study. For his faith in my judgment during the planning and development of the research endeavor, I am deeply grateful.

Dr. William D. Dowling, as committee chairman, gave me the unique opportunity to integrate my food and nutrition background with an adult education emphasis. I cordially thank Dr. Dowling for his interest and support throughout the doctoral program.

Dr. Anita R. McCormick has given of herself by serving as a member of the dissertation committee. Her administrative insight and attention to detail have demonstrated the importance of clarity in communication. I appreciate the experienced advice she gave regarding the selection of an area for dissertation research.

Dr. Clarence J. Cunningham has provided sustaining and unfailing support throughout my doctoral program particularly in the design and statistical analyses of this study.
A very special appreciation is expressed to Dr. Rachel M. Hubbard, Chairperson of the Department of Human Nutrition and Food Management, for giving me understanding, encouragement, and continuing support throughout the doctoral program. It has been a joy to work for and with Dr. Hubbard who is a guiding inspiration not only for me but for other students as well.

The assistance and cooperation of the eight Adult EFNEP Coordinators made the various logistics needed for the study pleasurable and exciting.

The enthusiasm, willingness, and trust of the sixty-one Nutrition Aides who participated in the study was heartening and commendable.

The moral and psychological support given freely and affectionately by special friends and colleagues kept motivation high and self-confidence afloat during the trying moments.

The secretarial skills and talents of Ada Morgan and Angelita C. Canlas have been invaluable. I heartily thank them for their willingness to help.

To my mother, two sisters and their families, I express my love and lasting appreciation. I will eternally be grateful for the loving support and confidence they have afforded me over the years.
VITA

February 6, 1938 . . . . . . . Born - Manila, Philippines

1957 . . . . . . . . . . . . Bachelor of Science in
Home Economics
University of the Philippines
Diliman, Quezon City

1957-1958 . . . . . . . Teaching Associate
Department of Food and Nutrition
College of Home Economics
University of the Philippines

1958-1959 . . . . . . . Dietetic Internship
The Ohio State University Hospitals
Columbus, Ohio

1959-1960 . . . . . . . Therapeutic Dietitian
The Ohio State University Hospitals
Columbus, Ohio

1960 . . . . . . . . . . . . Master of Science
The Ohio State University
Columbus, Ohio

1960-1961 . . . . . . . Administrative Dietitian
Yale Medical Center
New Haven, Connecticut

1961-1963 . . . . . . . Instructor
Department of Food and Nutrition
College of Home Economics
University of the Philippines

1964-1968 . . . . . . . Senior Dietitian and Clinical
Instructor
The Ohio State University Hospitals
Columbus, Ohio
1968-1969 . . . . . . . . . Consulting Dietitian
           Manila, Philippines

1969-1977 . . . . . . . . . Extension Nutrition Specialist and
           Instructor
           Department of Human Nutrition and
           Food Management
           School of Home Economics
           The Ohio State University
           Columbus, Ohio

PUBLICATIONS

"A Critical Analysis of the Professional Role of Hospital Dietitians
in the Philippines with Implications for Improving Their Professional
Status." The Dietetic Association of the Philippines Bulletin,

FIELDS OF STUDY

Major Field:  Adult Education

Studies in Learning Theories, Trends, and General Methods in
Adult Education, Professor William D. Dowling

Studies in Organization and Administration of Adult Education
Programs. Professor David L. Boggs

Professors Clarence J. Cunningham and J. Robert Warmbrod

Studies in Curriculum and Instruction. Professors Paul R. Klohr
and James K. Duncan
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ACKNOWLEDGMENT</th>
<th>iii</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITA</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xii</td>
</tr>
</tbody>
</table>

Chapter

I.  INTRODUCTION ........................................... 1
   Background of the Study .......................... 3
   The Paraprofessional Worker ...................... 4
   The Paraprofessional in EFNEP .................... 5
   Training the Paraprofessional ................. 6
   Statement of the Problem .................... 7
   Hypotheses ................................ 10
   Limitation of the Study .................... 12
   Significance of the Study .................. 12
   Definition of Terms ..................... 13

II. REVIEW OF RELATED LITERATURE .................... 15
   Training and Instructional Approaches
   Used in Adult Education Settings .......... 15
   Training and Instructional Approaches
   Used in Programs for Disadvantaged
   Adult Learners .......................... 25

III. METHODOLOGY AND PROCEDURES ................... 31
   Population .................................. 31
   Learning Project Used in the Training
   Activity .................................. 34
   Correspondence Instruction ................. 35
   Discussion with Laboratory Experience .......... 35
   Discussion with Gaming Experience .......... 36
   Control Group ................................ 36
   Research Design and Experimental
   Procedures .................................. 36
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumentation</td>
<td>39</td>
</tr>
<tr>
<td>Analysis Procedures</td>
<td>41</td>
</tr>
<tr>
<td>Testing the Hypotheses</td>
<td>41</td>
</tr>
<tr>
<td>IV. RESULTS AND DISCUSSION</td>
<td>43</td>
</tr>
<tr>
<td>Testing the Hypotheses</td>
<td>47</td>
</tr>
<tr>
<td>V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>76</td>
</tr>
<tr>
<td>Conclusions</td>
<td>79</td>
</tr>
<tr>
<td>Recommendations</td>
<td>81</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>83</td>
</tr>
<tr>
<td>Appendix A</td>
<td>84</td>
</tr>
<tr>
<td>Letters to Adult EFNEP Coordinators and County Home Economists</td>
<td></td>
</tr>
<tr>
<td>Appendix B</td>
<td>37</td>
</tr>
<tr>
<td>Learning Project on Weight Modification</td>
<td></td>
</tr>
<tr>
<td>Training Outlines</td>
<td></td>
</tr>
<tr>
<td>Laboratory Application Activities</td>
<td></td>
</tr>
<tr>
<td>Game Descriptions</td>
<td></td>
</tr>
<tr>
<td>Appendix C</td>
<td>107</td>
</tr>
<tr>
<td>Personal Data Sheet</td>
<td>109</td>
</tr>
<tr>
<td>Appendix D</td>
<td></td>
</tr>
<tr>
<td>Knowledge Pretest/Posttest</td>
<td></td>
</tr>
<tr>
<td>Appendix E</td>
<td>118</td>
</tr>
<tr>
<td>Letter to Mt. Gilead Area County Home Economists and Nutrition Aides</td>
<td></td>
</tr>
<tr>
<td>Appendix F</td>
<td>120</td>
</tr>
<tr>
<td>Likert-type Attitude Scale</td>
<td></td>
</tr>
<tr>
<td>Appendix G</td>
<td>125</td>
</tr>
<tr>
<td>Demographic Variables, Pretest and Posttest</td>
<td></td>
</tr>
<tr>
<td>Scores on Knowledge Test and Attitude Scale</td>
<td></td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>130</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Four Experimental Groups</td>
<td>32</td>
</tr>
<tr>
<td>2. Schematic Diagram of the Research Design</td>
<td>37</td>
</tr>
<tr>
<td>3. Personal Data for Experimental Subjects</td>
<td>44</td>
</tr>
<tr>
<td>4. Participation in Educational Activities Not Related to Employment</td>
<td>46</td>
</tr>
<tr>
<td>5. T-Tests Comparing Pretest Mean with Posttest Mean for Four Experimental Groups on a Knowledge Test of Concepts Related to Weight Modification</td>
<td>48</td>
</tr>
<tr>
<td>6. T-Test Comparing Pretest Mean with Posttest Mean for Four Experimental Groups on Concepts Measured by a Likert-Type Attitude Scale</td>
<td>50</td>
</tr>
<tr>
<td>7. Coefficients of Correlation Between Posttest Scores on the Knowledge Test and Pretest Scores, Age, Education, and Duration of Employment</td>
<td>51</td>
</tr>
<tr>
<td>8. Analysis of Covariance Comparing Knowledge Posttest Scores of Three Treatment Groups Controlling for Prior Knowledge</td>
<td>52</td>
</tr>
<tr>
<td>9. Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Knowledge Posttest Scores of Three Treatment Groups</td>
<td>53</td>
</tr>
<tr>
<td>10. Scheffé Method of Multiple Comparisons Using Adjusted Criterion Means of Three Treatment Groups on the Knowledge Test</td>
<td>56</td>
</tr>
</tbody>
</table>
11. Analysis of Covariance Comparing Posttest Scores of Three Treatment Groups on a Knowledge Test of Concepts Related to Weight Modification Using Years of Education as Covariate.  


15. Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Post Attitude Measures of Three Treatment Groups.  

16. Scheffe' Method of Multiple Comparisons Using Adjusted Criterion Means of Three Treatment Groups.  

17. Comparison of Posttest Scores Between the Correspondence Instruction Group and the Control Group on a Knowledge Test of Concepts Related to Weight Modification.  

18. Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Posttest Scores on the Knowledge Test.  

19. Comparison of Posttest Scores Between the Correspondence Instruction Group and the Control Group on Concepts Measured by a Likert-type Attitude Scale.  

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Comparison of Posttest Scores Between the Discussion-Laboratory Group and the Control Group on a Knowledge Test of Concepts Related to Weight Modification</td>
<td>68</td>
</tr>
<tr>
<td>22.</td>
<td>Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Posttest Scores on the Knowledge Test</td>
<td>69</td>
</tr>
<tr>
<td>23.</td>
<td>Comparison of Posttest Scores Between the Discussion-Laboratory Group and the Control Group on Concepts Measured by a Likert-type Attitude Scale</td>
<td>70</td>
</tr>
<tr>
<td>24.</td>
<td>Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Posttest Scores on the Attitude Scale</td>
<td>71</td>
</tr>
<tr>
<td>25.</td>
<td>Comparison of Posttest Scores Between the Discussion-Gaming Group and the Control Group on a Knowledge Test of Concepts Related to Weight Modification</td>
<td>72</td>
</tr>
<tr>
<td>26.</td>
<td>Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Posttest Scores on the Knowledge Test</td>
<td>73</td>
</tr>
<tr>
<td>27.</td>
<td>Comparison of Posttest Scores Between the Discussion-Gaming Group and the Control Group on Concepts Measured by a Likert-type Attitude Scale</td>
<td>74</td>
</tr>
<tr>
<td>28.</td>
<td>Criterion and Control Variable Means Used in the Analysis of Covariance Comparing Posttest Scores on the Attitude Scale</td>
<td>75</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Representation of Adjusted Criterion (Treatment) Means on the Knowledge Test Using Pretest Scores as the Covariate</td>
</tr>
<tr>
<td>2.</td>
<td>Representation of Adjusted Criterion (Treatment) Means on the Attitude Scale Using Prior Attitude Measures as the Covariate</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Teaching adults is considerably different from teaching children and youth. Adult learners are unique in their life experiences, values, interests, responsibilities and motivations. Adults enter the learning arena with needs unlike those of children and youth. They normally participate in learning ventures by choice and with a purpose. Adults have different physiological characteristics and may not learn as rapidly as children do. Consequently, there must be corresponding differences in the appropriateness of teaching methods, instructional techniques and devices. Methods traditionally used in schools, universities and other formal settings have sometimes been conveniently but not always appropriately used in adult education programs. Instructional approaches and teaching methods should build on the adult's reservoir of life experiences. These experiences offer tremendous opportunities for meaningful learning.

In andragogy, the art and science of helping adults learn, there is a marked shift from the transmittal techniques of teaching as in lectures and assigned readings toward experiential techniques such as simulation, discussion, case studies and laboratory application (Knowles, 1970).

Knowles (1970) has pointed out that: "Adults engage in learning largely in response to pressures they feel from current life problems;
their time perspective is one of immediate application....they tend to enter any educational activity in a problem-centered frame of mind" (p. 48). Accordingly, andragogy is a student-centered, problem-finding and problem-solving technology. Adult learning commences with the problems and concerns the learners bring with them. Much of adult learning begins because of a responsibility, a question or something puzzling within the learner.

Tough (1971) stated that most adult learning comes from the personal and practical needs of everyday living. A major change in the life and developmental tasks of the adult such as marriage, a new job, buying a house often explains adult participation in educational programs.

Learner involvement or activity on the part of the student is a vital ingredient in all learning transactions and is essential to adult learning. An adult learner is actively involved in the learning process when he assumes the major responsibility for his learning behaviors. Most cognitive theories of learning stress the need for the learner to be involved and active either in practice or in an active search for meaning. Mere exposure to subject matter content is not a guarantee the adult learner will learn. He has to engage in the active aspects of cognition such as judging, determining relationships and problem solving. Learning becomes more effective and retention is greater when the learner uses more than one sense during the learning transaction. When the adult learner interacts with the teacher, other learners, equipment, materials and resources, several senses are utilized. These interactions lead to active rather than passive learning.
Major barriers to adult learning are fear about the reaction of friends, fear of failure and the real or imagined lack of ability to learn. A greater fear barrier is built when the adult student remains a passive listener. However, if guided into active exploration of the subject matter, the adult frequently realizes that fears are unreal and therefore becomes more willing and able to learn. Active and participatory learning is more rapid, stable, and transferrable in adults than other forms of learning (Stephens & Roderick, 1972).

Many adult education courses are conducive to learner involvement and active participation. Action-oriented approaches such as role-playing, small group discussion, case studies and special projects have been used successfully for years in adult learning experiences. Research and development of new instructional approaches and teaching strategies in participative learning continue (NAPCAE, 1972). It is worthwhile to investigate how active learner participation can help solve some of the problems in adult learning and improve the learning transactions which take place in the adult classroom.

Background of the Study

A major thrust of adult education in the seventies has been to meet the educational needs of traditionally underprivileged groups. Among these are school dropouts, unemployed youth, unemployed adults, the rural population, the aged and the socially disadvantaged adult.

The Third International Conference on Adult Education convened by UNESCO in Tokyo in 1972 emphasized in the concluding statement: "Experience shows that the provision of more education in most communities
tends to favor most the already well educated; the educationally underprivileged have yet to claim their rights. Adult education is no exception to the rule, for those adults who most need education have been largely neglected – they are the forgotten people. Thus the major task of adult education during the Second Development Decade of the United Nations is to seek out and serve these forgotten people." (p.19)

In providing a "second chance" to disadvantaged adults, programs of adult and continuing education play an indispensable role in educating the traditionally underprivileged.

The complex needs of disadvantaged adults warrant well-planned learning projects and a variety of auxiliary learning activities. Flexible teaching methods must be utilized when working with disadvantaged adult learners. Their attention span may be relatively short and any strategy that can attract and hold attention helps in the learning transaction. Research is essential to understand the personal and social conditions under which disadvantaged adults participate in learning activities, for what reasons and by what methods and techniques.

The Paraprofessional Worker

From 1965 to 1975 profound revolution in the human services such as education, health, and welfare had occurred. The nationwide New Careers program was a recognition of the potential contribution to society that can be made by capable adults from poverty backgrounds. Thousands of relatively unskilled, low income adults were recruited from the nation's
poverty groups and employed in educational, welfare, and health institutions (Manpower Administration, 1972). This movement not only helped in meeting several social problems but also in improving the quality of human services. Meaningful service roles have been created for individuals who lack the formal requirements for professional status. The use of paraprofessionals or non-professionals similar in economic and ethnic background to low-income, minority-group clientele help to make many human services more responsive to these groups (Goldberg, 1967).

Generally, the paraprofessional is selected from the ethnic or subcultural group to which their clientele also belong. The paraprofessional understands the poor and socially disadvantaged, relates well to them and may have had prior experience in working with limited resource families (Guide for EFNEP, 1974). Paraprofessionals possess an inherent advantage - that of being peers of their clients thus enhancing their ability to enter into the client's frame of reference, empathize and be effective with them.

The Paraprofessional in EFNEP

Paraprofessionals in the Expanded Food and Nutrition Education Program are employees of the Cooperative Extension Service who work under the direction of professional home economists and/or adult program coordinators. This nutrition education program came into existence in November 1968 and was given the charge "to help families living in poverty or near poverty ...especially those with young children...to
acquire knowledge, skills, and changes in behavior to achieve adequate diets providing normal nutrition." (EFNEP...Accomplishments, 1975).

Paraprofessionals have become important assets. Their use in direct service roles has proven to be effective in the Expanded Food and Nutrition Education Program.

Applicants for paraprofessional (nutrition aide) positions are recruited from the target areas in which they are to concentrate their efforts.

Initial training in food and nutrition related subject matter is provided by the professional home economist and/or adult program coordinator. Only in the eight metropolitan counties of Ohio are there adult program coordinators. This training period consists of an equivalent of 120 hours of intensive instruction tailored to fit individual needs. On-the-job training consists of the activities and learning experiences that help the paraprofessional understand the role in becoming a more effective and competent worker. The content for this phase of the training period is based on program objectives and immediate concerns closely related to food and nutrition.

Training the Paraprofessional

Persons in the lower socio-economic strata, like the rest of society, have a wide range of capability and potential for change through training. Their skills can be upgraded by manipulating motivation variables such as gainful employment and opportunities for better education. Evidence from training experiments in industry show that a high proportion of persons with limited intellectual performance can be groomed for
positions requiring semi-technical skills (Goldberg, 1966).

A short pre-service training period is recommended for para-professionals in direct service roles to avoid undue anxiety in a new learning environment. This component of the training program is basically to orient the new workers to the institution, the job, the subject matter discipline and to provide some basic skills for job performance.

The succeeding period of the training program is one of combined supervised field work and instruction. Usually the instruction component deals with specific skills and general knowledge required of human service roles in addition to knowledge of the subject matter area. Much time, effort, and money are expended in training para-professionals. In view of such a commitment, the manner and auspices of such a training as well as the qualifications and preparation of training agents are concerns of adult educators. Further exploration is needed to determine the capacity of the poor and the kinds of training they will need in assuming direct service roles (Goldberg, 1966).

**Statement of the Problem**

With rapidly proliferating programs for the disadvantaged, there remains a serious lack of hard data and a small body of knowledge available to guide adult educators in instructing adult learners from the lower socio-economic stratum. There is also a scarcity of basic research on the effectiveness of specific techniques in achieving behavioral change through instruction among both disadvantaged children and adults (Gordon, 1969).
Research on instructional methodology used with disadvantaged adult learners is sparse. There is little information available on instructional approaches used in the training of paraprofessionals with minimal formal education who come from the lower socio-economic stratum of the population. Much of the research on instructional methods has been in college situations. The youthfulness and grade achievement orientation of experimental populations which characterizes research on instructional methodologies make it difficult to apply available findings to the adult education setting (Hill, 1960).

Adults of different backgrounds, abilities, and ages have been frequently taught as a homogeneous group by teachers of primary and secondary schools using highly inappropriate techniques such as lecture with no student input, learning by rote memorization, and the use of teaching materials designed for school-age children.

This study attempted to analyze the effectiveness of three instructional approaches: correspondence instruction, small group discussion with laboratory experience, and small group discussion with a gaming experience, in facilitating learning and attitude change in a training component designed for paraprofessionals in the Ohio Cooperative Extension Service. Effectiveness was measured in terms of achievement of knowledge and attitude change toward flexibility in the practice of nutrition in a learning project on weight modification. The three instructional approaches were chosen because each involved the adult learner as an active participant in the learning process. A variety of learning activities is valuable to the disadvantaged learner because they facilitate the initiation and maintenance of attention.
To provide structure and data for the study, a three-session training component on weight modification was developed by the investigator. Four intact groups of paraprofessionals were used in the study. The treatment groups experienced three different instructional approaches to learning about weight modification while the fourth group served as a control and received no instruction on weight modification concepts. The group identified as "correspondence instruction" participated in a six-lesson course with a self-study format in which group members worked on individual lesson assignments without any supervision from the instructor. The group identified as "discussion-laboratory" participated in laboratory application activities which supplemented the discussion period. The third group identified as "discussion-gaming" was presented content material in a small group discussion format with the use of an educational game to reinforce concepts covered in the discussion period. The control or no treatment group did not participate in any training activities directly related to weight control for the duration of the experiment. Both discussion groups were taught by the investigator.

A multiple choice test was developed by the investigator as the instrument to measure knowledge gain. Attitude change toward flexibility in the practice of nutrition related to weight control was measured by a Likert-type attitude instrument developed at the University of Missouri-Columbia (Carruth & Anderson, 1977).
Hypotheses

The fundamental purpose of this study was to analyze the effectiveness of three instructional approaches: correspondence instruction, discussion with laboratory experience, and discussion with a gaming experience in changing knowledge and attitudes of selected paraprofessionals in Ohio's Expanded Food and Nutrition Education Program during a learning project on weight modification. Three treatment groups and a control group made up the four experimental groups used in the study.

The following hypotheses were formulated:

1. There will be a significant difference between pretest and posttest means of the four experimental groups on the knowledge test. It is expected that the experimental subjects will perform better on the criterion measure.

2. There will be a significant difference between pretest and posttest means of the four experimental groups on the attitude scale. It is expected that the experimental subjects will attain positive attitude change on the criterion measure.

3. There will be a significant difference between posttest means of the three treatment groups on the knowledge test when initial differences between groups have been adjusted with respect to prior knowledge of the subject matter, education, age and duration of employment as a nutrition aide.

4. There will be a significant difference between posttest means of the three treatment groups on the attitude scale when initial
differences between groups have been adjusted with respect to prior attitude measures, education, age, and duration of employment.

5. Posttest means of the correspondence instruction group will be higher than that of the control group on the knowledge test when initial differences between the two groups have been adjusted with respect to prior knowledge of subject matter, education, age, and duration of employment.

6. Posttest means of the correspondence instruction group will be higher than that of the control group on the attitude scale when initial differences between the two groups have been adjusted with respect to prior attitude measure, education, age, and duration of employment.

7. Posttest means of the discussion with laboratory experience group will be higher than that of the control group on the knowledge test when initial differences between the two groups have been adjusted with respect to prior knowledge, education, age, and duration of employment.

8. Posttest means of the discussion with laboratory experience group will be higher than that of the control group on the attitude scale when initial differences between the groups have been adjusted with respect to prior attitude measure, age, education, and duration of employment.

9. Posttest means of the discussion with gaming experience group will be higher than that of the control group on the knowledge test when initial differences between the groups have been adjusted with respect to prior knowledge, education, age, and duration of employment.

10. Posttest means of the discussion with gaming experience group will be higher than that of the control group on the attitude scale when
initial differences between the groups have been adjusted with respect to prior attitude measures, education, age, and duration of employment.

Limitations of the Study

The subjects used for the study consisted of 61 Nutrition Aides (paraprofessionals) in Ohio's eight metropolitan counties. Therefore, the population may not have been representative of paraprofessionals in other states. Generalizations made from the study can only apply to the population used.

This study was also limited to a three-week training period.

Significance of the Study

As evidenced by the 1970-71 indepth evaluation of the Expanded Food and Nutrition Education Program (Program Performance, 1971), training of new paraprofessionals has declined in adequacy and the quality of training programs has been on the downgrade. The evaluation further indicated that inservice training of paraprofessionals has failed to meet the changing needs of EFNEP as it matures. Group training sessions have not fully utilized the different experiences and skills of the paraprofessionals. The indepth evaluation also demonstrated that there was a clear need for improvement in continuing training objectives, techniques, and support materials.

This study was to provide empirical evidence on the use of a variety of training approaches that actively involve disadvantaged adult learners. Information generated by the study will be useful in providing adult educators and administrators of adult education programs insights on selecting appropriate instructional methods and techniques.
in planning viable programs for the disadvantaged adult learner. Knowledge about the effectiveness of instructional approach, combined with information about learner characteristics, should result in the design of more effective and meaningful educational experiences for adults.

Analyses of actual learning situations performed in the investigation may serve not only as a basis for future program prescription but also to provide direction in the evaluation of projected training programs in the Cooperative Extension Service.

Considering the limitations of the study, it is felt that the findings were useful and do contribute to the larger body of knowledge in adult learning.

Definition of Terms

Paraprofessional (Nutrition Aide): an employee of the Cooperative Extension Service who receives direction from professionals and is employed to assist and/or extend the efforts of Extension program professionals through direct contact with clientele in the conduct of educational programs, projects, etc.

Inservice training: a periodic, meaningful activity in which the supervising agent and/or other Extension staff members provide continuous on-the-job training for the paraprofessional.

Correspondence instruction: a type of instructional approach which follows a self-study format; all members of the group work on individual lesson assignments.
Small group discussion with laboratory experience: application of concepts covered in the discussion period is in the form of laboratory-type activities.

Small group discussion with a gaming experience: concepts covered in the discussion period are reinforced by an educational game.

Instructional approach: a combination of techniques established by the trainer agent and/or professional to facilitate learning among a defined body of participants.
CHAPTER II

REVIEW OF RELATED LITERATURE

**Training and Instructional Approaches Used in Adult Education Settings**

Adults are a diversified group of learners because of the differences in mental ability, performance, socioeconomic background, motivations, needs and other factors. Educators, especially those primarily responsible for the education of adults need to know more about the dynamics of selecting effective and efficient instructional approaches and strategies. Adult education programs become more successful when teachers and administrators can prescribe appropriate instructional methodologies with greater precision.

The theory of method in adult education proposed by Coolie Verner (1962) is summarized in the following statement:

"Desirable changes in adult behavior are accomplished when the processes employed for organized systematic learning are effective in transmitting the necessary knowledge in a manner appropriate to the organizational and cultural patterns of the adult participants involved and when they facilitate the acquisition of knowledge by those participants through procedures appropriate to the content, the learning situation, and the individual participant.

When the methods employed to introduce proposed changes accomplish learning systematically and when a variety of techniques are utilized to facilitate the acquisition of knowledge from which systematic learning results, then the alterations in behavior that occur will have a greater degree of permanency." (p. 25)
Generalizations can be made about research on the effectiveness of different instructional techniques with various kinds of learning. Instructional techniques that prescribe active behavior in learning are generally more effective than those that involve passive learner behavior. Learning objectives are accomplished more effectively when a variety of instructional techniques are incorporated into the teaching learning transaction as no one technique is appropriate for all learning tasks (Anderson & Niemi, 1969). Learner involvement in the action is the key to success in adult learning as it is in all learning (NAPCAE, 1972).

In a comparative study of an active learning approach and the lecture discussion method for prospective elementary school teachers, significant gains both in mathematics achievement and positive attitude change were noted in favor of the active learning approach. The active learning approach consisted of a series of flow-chart lesson plans, utilized a combination of lectures by the instructor, recitation by students, class discussion, reading assignment, laboratory methods and student-centered activities (Leitch, 1972).

According to educators in the Hollywood Adult School, the following methods, listed in the order of their effectiveness are most successful (NAPCAE, 1972):

1. Actual experience through simulating real-life situations
   - workshop activities, discussion methods, special projects;
2. Laboratory experiments, solution of problems;
3. Drill and practice;
4. Demonstrations, with functioning materials and equipment;
5. Sound motion pictures and other visual aids; and

Selection of appropriate instructional methods and techniques depends on educational objectives and learner characteristics. If objectives primarily relate to the acquisition of knowledge and factual information, then the learning transaction should include activities such as reading, viewing a film, lecture or discussion. If the educational objectives are primarily related to attitude change, the learning transaction should include activities such as role playing, case study or discussion while skills are taught by practice, demonstration and repetition. Facilitators in any learning transaction should know and understand the types of learning activities most effective for the attainment of educational objectives (Smith, 1976).

Verner and Davison (1971) have indicated in their monograph on *Psychological Factors in Adult Learning and Education*, that the learning process imposes requirements upon instruction that will influence the choice of an instructional technique:

1. Learning is an active process and adults prefer to participate actively.
2. Group learning is more effective than individual learning.
3. Learning that is applied immediately is retained longer and is more subject to immediate use than that which is not.
4. Learning new material is facilitated when it is related to what is already known.

5. The existence of periodic plateaus in the rate of learning necessitates frequent changes in the nature of the learning task to insure continuous progress.

6. Learning is facilitated when the learner is aware of his progress.

In any teaching learning transaction, appropriate instructional methods and techniques should be tailored to the adult learner's characteristics. This process will assist the learner's participation in educational programs designed and developed for adults.

Adults can be instructed within four broad patterns - individual, small group, large group, and mass media. Within each pattern, a successful teacher uses techniques and strategies to fit the program, for the learners and fit his own abilities (Kreitlow, 1972). Different learning needs necessitate different training approaches. Where assimilation is the main objective, smaller groups are more effective than large classes. In the field of adult education, small group instruction is a standard practice. Adults tend to accept this format as a preferred learning pattern. To the trainer or facilitator, the small group discussion technique is probably the most varied, flexible, and effective instructional approach. It makes full use of the experience, knowledge and expertise the adult learners have as they interact with other learners in a group setting.
Experimental studies have demonstrated that "active" learning behaviors are more effective than "passive" learning behaviors. One reason for this may be that students can express their opinions, make comments and participate actively in the learning process (McKeachie, 1963). The atmosphere in group discussion tends to be conducive to learner involvement and interaction. Discussion techniques provide students with an opportunity to integrate and apply factual information, practice critical thinking, discover solutions to problems and evaluate conclusions. During group discussion, the learner verbalizes opinions and feelings, expresses concepts and examines opposing points of view (Long & Ulmer, 1971). The adult learner's active role in the learning process allows him to perceive learning tasks as problems he can solve.

To take full educational advantage of the adult learner's interest in interchange and desire to learn in small groups, many group approaches may be used. There are guided group discussion techniques, sensitivity training, laboratory application, buzz groups, groups using case studies, simulation exercises, educational games and role playing strategies. Although widely divergent in approach, all make use of interpersonal relationships and interaction. Group approaches have validity for use with a wide variety of participants of different ages, and with different goals and learning tasks. The crucial issue lies in the choice of an appropriate group approach (Echols, 1971).

The development of novel approaches to involve the adult learner actively in the learning process continues. The use of learning games has gained popularity in recent years. Games are one of the most successful
action-oriented teaching techniques because they involve students in situations similar to those which are faced in real life (NAPCAE, 1972). Learning games not only motivate and increase enthusiasm but also provide factual information, verbal and interpersonal skill development, the opportunity for developing problem-solving abilities and intellectual flexibility in approaching problems. They are unique and may effectively develop motor skills, intellectual skills and cognitive strategies.

Today's students need to be involved when learning. Teaching strategies which have built-in involvement such as simulation games provide an effective medium for learning (Kidder, 1971).

Research supports the hypothesis that attitudes can be changed by playing social simulation games. Kidder (1971) reported that attitude change was a function of the emotional impact of simulation games on the participants. However, in teaching introductory economics at the junior college level, students in classes that participated in the learning game *Marketplace*, did not achieve attitude change (Wentworth, 1972).

In 1964, Gordon (1970) reported that all participants in a game tended to acquire a feeling for the process being simulated and an appreciation of its complexity. Participants also tended to gain more confidence that they could control their own lives. In research with the *Consumer* game, Zaltman has shown that the extent of game participation affects the degree of learning. The more frequently a player borrows money in the game, the more likely he will answer post-game questions correctly (Harry, 1969). Research also suggests that
students learn more if play is stopped after several rounds for a class discussion to take place. The game should complement the conventional instructional method being used (Harry, 1969).

There are adults who are unable or unwilling to engage in group methods. Some adults learn more in an informal, personal and individualized setting. Adult learners prefer learning in a flexible situation where they are treated as independent learners. The autonomous learner seeks a particular kind of teaching that helps him discover his own problems, his own aptitudes and his own answers. The role of instruction in preparing an adult to become an autonomous learner is stated by J. Bruner (1966), "Instruction is a provisional state that has as its object to make the learner or problem solver self-sufficient." (p. 53)

Attempts are being made to design learning experiences for adults who are unable to engage in group methods. Research on the effectiveness of individual methods of instruction in adult settings is sketchy and inconclusive (Kotaska & Dickinson, 1975). Programmed instruction has received far more research attention than other methods of individualized instruction. Childs (1971) has indicated that research on the methodology of teaching by correspondence is badly needed since practically none has been carried out in this important area.
After over a hundred years of existence, correspondence study is only just now beginning to be taken seriously as an important instructional method. The changing concepts of education - that it should be one of life-long learning - has created a growing demand for continuing education. This has, in turn, led to a changing attitude toward education by correspondence. In addition to reaching the hard-to-reach, correspondence instruction also provides opportunities for learner autonomy. It is becoming more of a supplement to other instructional methods rather than a substitute (Erdos, 1975).

Correspondence instruction places much emphasis on motivation and discipline on the part of the learner. These are characteristics normally associated with adult rather than youthful learners. Correspondence instruction compares favorably with other methods of teaching in terms of learning outcome according to a study done by Childs (Brenden, 1975).

Research seems to indicate that correspondence students perform just as well, and in some instances better than their classroom counterparts both in regular correspondence course instruction and supervised correspondence study with high school students. Most of the studies undertaken in the 1920's and 1930's indicated that achievement in adult correspondence study is on a par with achievement in classroom settings (Matheison, 1971).

Dubin and Taveggia (Childs, 1971) of the University of Oregon examined a number of studies which compared the results of face-to-face instruction with results obtained from the unsupervised
independent study and said: "The average difference between these methods
...is not significantly different from a 'true' mean difference of zero"
(p.247).

Since Dubin and Taveggia's report, published in 1968, was concerned
only with studies in college settings, one can only speculate that
studies involving adult instruction may demonstrate similar findings.

Researchers have extensively studied teaching approaches and
instructional modes in college settings. Atherton at the University
of Illinois (1972) compared the effects of three teaching methods —
lecture, discussion, and independent study — on recall of facts, under­
standing of content and application of principles. Three undergraduate
classes in social welfare were used for the experiment. Scores on a
criterion examination were compared using the analysis of covariance
with grade point average as the covariate. The differences among the
three teaching methods were not significant. However, there was support
for the idea that face to face instruction has advantages. Teacher-
student contact provided a favorable climate for learning. The amount
of teacher contact per student was related to student learning
regardless of type of teaching method used.

In a college level course on the social and psychological aspects of
clothing, Lefebvre (1975) compared two methods of instruction, lecture
with discussion and independent study. These methods were compared
in terms of cognitive gain, retention of course material, student
course evaluation and affective behavior. Results indicated no signifi­
cant difference between treatment groups.
Pratzner and Hanson (1969) compared the relative effectiveness of two ways of structuring and presenting pre-service and initial in-service vocational-industrial teacher education lessons. The sample for the study consisted of potential vocational instructors. The two methods compared were: a) an integrated lecture-discussion course presented by a qualified vocational-industrial teacher educator and b) a packaged course consisting of 16 mm sound film presentations followed by group discussions. Related study guides and materials supplemented the film presentations. Differences in initial learning between the two methods were measured by scores on unit tests and final course examination. The findings of the study indicated that both integrated lecture-discussion and film-discussion approaches facilitated initial learning. However, the film-discussion approach appeared to be more efficient and provided consistency in presentation with a degree of adaptability and flexibility in discussion.

Results of a study comparing attitude modification of graduate students under two teaching methods in library science revealed that neither the lecture method of instruction nor the problem solving method influenced attitude change. However, a combination of the two teaching methods did influence attitude change (Bush, 1971). Partin (1967) found it doubtful that group discussion could affect change in attitude toward self-acceptance. Change is slow and gradual until a common denominator of awareness can be achieved among the discussion participants. It is possible that combinations and sequences of different instructional strategies can lead to better practices for facilitating affective responses (Khan and Weiss, 1973).
Hill (1960) had done a **Comparative Study of Lecture and Discussion** in which he found that interpersonal relationships and change become intellectual in nature. People did not learn how to approach and accept one another on a personal level hence differences in attitudinal structures were not handled easily. His findings in the discussion-lecture experiments indicate that participation in discussion did not result in attitude changes significantly greater than those occurring from lectures.

**Training and Instructional Approaches Used in Programs for Disadvantaged Adult Learners**

Anderson and Niemi (1969) define the term "disadvantaged" as referring to persons who are members of a poverty sub-culture and are handicapped with respect to the mode of the dominant society. This includes the "lower socio-economic citizenry", "low income people", "the educationally deficient", and other similar descriptive terms.

The term "socially handicapped or disadvantaged" is also inclusive of the social cultural factors that cause children to enter the school system with different understandings, skills, and attitudes because of the deprived circumstances of their lives. This type of disadvantaged usually persists throughout the individual's school life and may restrict later economic and social opportunities in adulthood.

Disadvantaged adults do not frequently experience success. They often feel inadequate and not capable of learning. Helplessness and anxiety are common manifestations of doubt in their ability to learn.
When disadvantaged adults participate in a learning transaction, they often find it difficult to concentrate for long periods of time. Attention and interest spans are relatively short.

The disadvantaged learner is unique in terms of economic, cultural, and social background. Havighurst noted that the disadvantaged, in racial and ethnic terms, are about equally divided between whites and non-whites (Lockette & Davenport, 1971)

Much has been written about the characteristics of disadvantaged learners. In summary, Melvin Gruwell (Goldstein & Wood, 1971) described them as:

1. Oriented to the physical and visual rather than the aural;
2. Content-oriented rather than form centered;
3. Externally-oriented rather than introspective;
4. Problem-centered rather than abstract-centered;
5. Inductive rather than deductive reasoners;
6. Inclined to communicate through actions rather than words;
7. Deficient in auditory attention and interpretation skills;and
8. Oriented toward concrete application of what is learned.

Characteristics of the disadvantaged learner as described previously, favor educational and training programs that are informal, personal and individualized. Verner and Davison (1971) have stated that the disadvantaged adult learner's need for activity will cause him to resist those techniques which involve passive learner behavior. "Active" methods of teaching such as role-playing, working on projects and small group discussion would probably be more acceptable.
Lectures and recitation techniques might not be well accepted. However, such techniques may be effective when supplemented by illustrative devices.

Adult classroom instruction that uses direct, realistic and visually apparent methods, materials and situations creates less frustration and disinterest among disadvantaged learners. Learning, to be effective, must be both an active thinking and doing process. Adults retain approximately 70 percent of what they learn while doing. Combining the use of different senses in a learning transaction generally produces best results (National Civil Service League, 1970).

Taba and Elkins (1966) emphasized the need for a variety of learning activities during a learning episode by stating: "Students with meager background and experience, with short attention span and poor work habits, need to engage in a great variety of overt activities ....activities that help hold attention, provide appropriate starting points and create a sense of accomplishment". (p. 277)

Anderson and Niemi (1969) reviewed research pertaining to the disadvantaged learner in an adult education setting. They cited eight studies that indicated the disadvantaged adult learner preferred face to face personal communications. In four other studies, they found that the medium of communication with the greatest likelihood of success was either the one to one basis or with small natural groupings and that small group sessions were notably effective in changing behavior. They concluded: "The instructional process used in ordinary educational situations are appropriate for a mass culture but they are rejected by the poverty sub-culture as too impersonal and formalistic. More
emphasis was needed on demonstration, discussion, and similar processes which involved the individual in learning as an active participant rather than as a passive observer." (p. 69)

Texas Education Agency in 1972 reported the following: "Activity-centered approaches are being used successfully with disadvantaged and low elementary students. Multi-activities are more effective than are single or dual activities. Gaming and other forms of simulation are thought to have special advantages for all students particularly the disadvantaged. Research data on the efficacy of gaming when compared with traditional methodology are meager; especially lacking are data on the uses and effects of gaming with disadvantaged students." (p. 27)

Extensive research has indicated that learning could be increased with disadvantaged and low-achieving students when the instructional materials are carefully sequenced and structured into an individualized learning format. Kahle, Douglass and Nordland (1976) demonstrated that individualized audio-tutorial instruction was as effective as traditional group instruction in educating urban minority students in science. However, when the disadvantaged students were allowed to pace themselves through the instructional modules, the individualized instructional format was more effective in increasing learning rather than when they were directed through materials by a teacher. Learning effectiveness significantly increased with the individualized audio-tutorial teaching strategy.
Among adults, learning is more effective when they are allowed to set their own pace. Knox (1977) stated that most adults in their forties and fifties have about the same learning ability as they had in their twenties and thirties when they set their own pace.

In a descriptive study of the University of Wisconsin-Milwaukee Upward Bound and the Ripon College Upward Bound programs, teaching methods mentioned by interviewees as successful in engaging students as active partners in their education were those where teacher dominance was minimized and attention was constantly shifting from individuals, groups, experiences, subject matter content and materials. Successful teaching techniques employed were: eliciting and using students' ideas, encouraging discussions of controversial materials, fostering student interaction, engaging students in curriculum decision making and in general, approaching learning as a pleasure filled experience (Coron, 1969).

Paraprofessionals in Missouri's Expanded Food and Nutrition Education Program participated in a 1974 pilot project assessing the use of self-study guides. The extent to which the nutrition education assistants learned the subject matter contained in each of the self-study guides was measured by the use of pretests and posttests. Of the four different guides used in the study, the two guides that presented information about foods appeared to be of most interest to the participants. Some reasons given for not completing self-study guides were insufficient time, home conditions were not conducive to study, and
dislike for being required to study the guides on their own time. However, those paraprofessionals who completed both pretests and posttests scored significantly higher on the posttest than on the pretest. This indicated that some learning of content material took place among those who completed the tests. (University of Missouri Extension, 1975).

Perino (1971) compared four different training procedures for paraprofessionals to evaluate the relative effectiveness of each procedure. The four training procedures were: an integrated Basic Helping Skills Program; programmed and self-instruction; experiential; and lecture. Relative effectiveness was measured in terms of improvement in facilitative skills and self-actualization. Results failed to support the initial hypotheses that the four paraprofessional programs are not equally effective and that the Basic Helping Skills Program is more effective than the other three. Further investigation indicated that there were significant differences between the Basic Helping Skills Program group and the control group on six criteria. Training indigenous paraprofessionals should include techniques that emphasize doing rather than writing, an activity rather than lecture approach (Reiff and Riessman, 1965).

Adult educators have a real challenge in accepting the major responsibility for modifying the personal and social characteristics of the disadvantaged adult learner. Complex needs of disadvantaged adults warrant well planned educational and training programs. Creative, flexible and non-threatening instructional techniques should be tailored to the needs and learning patterns of the culturally unique adult learner.
CHAPTER III

METHODOLOGY AND PROCEDURES

The material in this chapter is presented in five sections. Description of the population, sample and allocation of the treatment to groups is covered in the first section. Section two, description of the learning project used in training activity, includes the instructional format and content information. Section three is a description of the research design and administration of experimental procedures. A description of measures, the dependent variables, test instruments and scoring procedures are discussed in section four. The last section is a description of the analysis procedures which include the statistical design and analyses used in the study.

Population

The experimentally accessible population for the study consisted of paraprofessionals (Nutrition Aides) in eight metropolitan counties on the Expanded Food and Nutrition Education Program (EFNEP) of the Cooperative Extension Service.

Eight pre-assembled groups (N=61) of nutrition aides participated in the quasi-experiment. These eight intact groups of paraprofessionals were from Ohio's metropolitan counties - Cuyahoga, Franklin, Hamilton, Lucas, Mahoning, Montgomery, Stark, and Summit. Only in these eight
counties were there groups of six or more nutrition aides. All other counties in the program have one to four nutrition aides each.

Allocation of control and experimental treatments to sample groups was done by randomly assigning a treatment level to two counties. (See Table 1.)

Table 1
Four Experimental Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>13</td>
<td>Control or no treatment</td>
</tr>
<tr>
<td>II</td>
<td>17</td>
<td>Correspondence instruction</td>
</tr>
<tr>
<td>III</td>
<td>15</td>
<td>Discussion with laboratory experience</td>
</tr>
<tr>
<td>IV</td>
<td>16</td>
<td>Discussion with gaming experience</td>
</tr>
</tbody>
</table>

\[ N=61 \]

In the study, there were three levels of the independent variable, type of instructional approach. The three treatment levels were: correspondence instruction, small group discussion with laboratory experience, and small group discussion with gaming experience. The no treatment or control group did not receive any special training on weight modification, the content area used in the study.
Throughout the study, the experimental groups will be referred to as indicated below:

1. Group I (N=13) - Control group: this group represented the control which consisted of nutrition aides from Mahoning and Stark counties. Originally there were 14 but one dropped out because of illness.

2. Group II (N=17) - Correspondence instruction: this group received correspondence instruction with no supervision from the trainer agent nor investigator. The group was made up of nutrition aides from Lucas and Summit counties.

3. Group III (N=15) - Discussion - laboratory: this group participated in a small group discussion format with laboratory application activities. Nutrition aides from Hamilton and Montgomery counties comprised this third group.

4. Group IV (N=16) - Discussion-gaming: this group participated in a small group discussion format with a gaming experience. Nutrition aides from Franklin and Cuyahoga counties were members of this group.

The four experimental groups were used because of accessibility and the promise of a sizeable number of subjects for each group as designed in the study. Nutrition aides in the metropolitan counties were selected to comprise a sample of culturally unique adult learners. For purposes of training, these aides were in intact groups. None of the groups had any indepth training on weight modification in the immediate past. Contacts were made by the investigator by mail and telephone to the adult program coordinators in the eight counties.
The study was explained to each coordinator as training schedules were set. County home economists were also sent information about the study and training schedules. (See Appendix A)

Learning Project Used in the Training Activity

Group II participated in a correspondence course on Weight Control. The course had six training components, namely: watch your weight; reducing weight; modifying eating habits; childhood obesity; physical fitness and the overweight; and fads and fad diets. This correspondence course was reprinted from Course 182, Watch Your Weight, with approval from Buck (1974).

The learning project used in the training activity for Group III (discussion-laboratory) and IV (discussion-gaming) was developed by the investigator who also served as instructor for both groups. For purposes of the study, weight modification concepts suitable for teaching disadvantaged adults were included. The learning experience on weight modification had six components which related closely to the correspondence course used by Group II.

Training sessions for each of the six components were conceptualized into lesson plans. (See Appendix B). A standard format was adopted for each plan. This included goals for the learner, presentation and discussion outline, and suggested learning activities. A panel consisting of two resident and one extension faculty in the Department of Human Nutrition and Food Management of the Ohio State University served as judges for content validity.
The basic content, sequence and length of each component in the learning project on weight modification was identical for the three treatment groups. The instructional approaches for the study have been mentioned previously but it is felt that they should be reviewed briefly at this point.

**Correspondence Instruction**

The presentation of instructional materials to Group II was made through correspondence (mail) as the communication medium. There are adults who have the initiative and resourcefulness to study independently and whose motivation comes from within. They find fulfillment in their sense of accomplishment and understanding. They find the aloneness of independent study to their own liking and soon learning becomes an end in itself. The learner then assumes increasing control of his own affairs and becomes an autonomous learner.

**Discussion with Laboratory Experience**

In using this instructional approach, the investigator who served as instructor for Group III, provided direction and some structure during the discussion period. After a brief presentation of content information, the group participated in an interchange of ideas and engaged in discussion. The activity was followed by the application of concepts learned by having group members practice solving problems. In the session on serving portions of food, group participants actually weighed, measured, and calculated kilocalorie values of selected food items. A complete list of laboratory experiences used by Group III is found in Appendix B.
Discussion with a Gaming Experience

The group discussion format used by Group IV was basically like the one used by Group III. The difference was in the application part where instead of problem solving exercises, an educational game was used. The learning game reinforced concepts learned in the presentation and discussion period. Using this instructional approach, the group members became actively involved with the teaching strategy. Learning games used by Group IV were of the formal learning type, those games with rules which incorporate subject matter principles. Game descriptions are found in Appendix B.

Control Group

Though this group did not receive any instruction, members took both the pretest and posttest.

Research Design and Experimental Procedures

The research design used in the study was the nonequivalent control group design described by Campbell and Stanley for use in quasi-experiments (1963).

The following is a graphic presentation:

\[
\begin{array}{ccc}
0 & X & 0 \\
\hline
0 & \hline
\end{array}
\]

X represents the exposure of a group to an experimental treatment, the effects of which are to be measured. 0 refers to a process of observation or measurement. The dashed line represents comparison groups not equated by random sampling. A control group is a group
of subjects whose selection and experiences are identical in every possible way to the treatment or experimental group except that they do not receive the treatment. Adding a control group to an experimental design provides the comparability in educational research that is required by science.

In a nonequivalent control group design, a pretest is essential to provide control for selection bias. Only through a pretest can initial group equivalence be demonstrated in the absence of randomization.

In this study, the independent or treatment variable was, type of instructional approach used in a training program for paraprofessionals. A schematic diagram of the research design used in the study is presented in Table 2.

Table 2

Schematic Diagram of the Research Design

<table>
<thead>
<tr>
<th>Selection Process</th>
<th>Group</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact</td>
<td>Control</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Intact</td>
<td>Experimental 1</td>
<td>0</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>Intact</td>
<td>Experimental 2</td>
<td>0</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>Intact</td>
<td>Experimental 3</td>
<td>0</td>
<td>X</td>
<td>0</td>
</tr>
</tbody>
</table>
Because of the inability of the investigator to randomize experimental subjects, data were collected on demographic factors: age, years of education, duration of employment, and participation in educational activities outside of employment. These relevant variables served as covariates or control variables in the study.

The procedural steps were as follows:

1. Sixty-one subjects in eight pre-assembled groups located in Ohio's metropolitan counties were selected to participate in the study.

2. The eight groups were randomly assigned to three experimental procedures related to a training approach or to a control.

3. Each subject completed a personal data sheet requesting information about age, years of education, duration of employment and participation in educational activities. This was completed prior to taking the pretest. A copy of the form used is found in Appendix C.

4. All experimental subjects were pretested on the dependent variables which were: (a) knowledge of weight modification concepts as measured by a multiple choice test developed by the investigator for that purpose; and (b) attitude change as measured by a Likert-type scale developed at the University of Missouri-Columbia.

5. Subjects comprising Group II were mailed a correspondence course on weight control consisting of six lessons. Two lessons a week were mailed by the investigator to members of Group II. Members of Group III and IV were taught by the investigator who kept experimental conditions as constant as possible. The actual training period
for Group III and IV consisted of eight hours of instruction over a period of three weeks.

6. At the conclusion of the training period, all experimental subjects were given the posttest which consisted of the same Likert-type attitude scale used in the pretest and the 30-item multiple choice test with test items arranged in a different order.

Instrumentation

One dependent variable, knowledge gain was measured by administering a multiple choice test on the concepts covered in the learning project prior to the beginning of the training period and again following the completion of the training activity. The 30 item four choice multiple choice test was developed by the investigator to assess weight modification concepts existing before and as a result of the training sessions. (See Appendix D) The instrument was pilot tested and evaluated by ten nutrition aides and four home economists in the Mt. Gilead Area for content and clarity. (See Appendix E) The nutrition aides and home economics agents served as a panel of external judges and were not part of the experimental sample. No validity or reliability studies were made on the multiple choice test other than the subjective process to arrive at content validity. This test was scored by giving one point for each item marked correct. This provided a score range of from 0 to 30. The posttest consisted of the same questions as were in the pretest only arranged in a different order. Scores on both pretest and posttest were used in analyzing data and testing hypotheses. A Pearson Product-Moment
correlation coefficient was computed between scores on the pretest and scores on the posttest. The coefficient was $r = .60$, significant at the .001 level.

Attitude change, another dependent variable, was measured by administering a 40 item Likert-type attitude instrument prior to and again following the training period. The instrument, developed at the University of Missouri-Columbia (Carruth & Anderson, 1977) was administered to selected paraprofessionals in Missouri's EFNEP. Statistical reliability was demonstrated over time while content validity was established initially by a panel of judges. Mean responses in a test-retest situation were highly correlated ($r = 0.58; p \leq .001$). The forty statements were developed to measure an individual's adaptability toward the practice of nutrition as related to weight modification. Individuals who had a favorable attitude toward applying nutrition principles to daily life styles would agree with statements that reflected that position and would disagree with statements unfavorable to applying nutrition concepts. The strength of agreement or disagreement was measured on a five point scale labeled: strongly agree, agree, undecided, disagree and strongly disagree. Scale values ranged from five for the positive end to one for the negative end of the scale. A total score on the attitude scale was based on summated scores over the forty items. The attitude instrument provided a possible maximum score of 200 reflecting a strong positive attitude toward the practice of nutrition as related to weight modification. A possible minimum score of 40 represented a strong negative attitude. The instrument is found in Appendix F. Pre and posttest scores were used in analyzing
data and testing hypotheses. A Pearson Product-Moment correlation coefficient was computed between these two sets of scores. The coefficient was $r = .89$, significant at the .001 level.

Analysis Procedures

Prior to statistical analysis, observed data were recorded, coded, and keypunched for processing by the computer. The Statistical Package for Social Sciences (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975) was employed to generate and analyze the data.

Lists of demographic variables, pretest scores and posttest scores on both knowledge and attitude tests for the four experimental groups are found in Appendix G.

Standard statistical procedures were used to test the null hypotheses. The level of significance established for use in the statistical analyses was .05. Significance implies that the difference between two means are real differences and not chance occurrences.

Testing the Hypotheses

Hypotheses 1 and 2: The t-test of correlated means comparing pretest and posttest scores for the four experimental groups was computed to see if there were significant gains in knowledge and improvement in attitude as a result of the training activity.

Hypotheses 3 and 4: Analysis of covariance was used to simultaneously test differences between means of the three treatment groups on both knowledge test and attitude scale. The analysis of covariance is a powerful technique which allowed the investigator to statistically equate independent variable groups with respect to one
or more antecedent variables (covariates) which were relevant to the dependent (criterion) variable. It also enabled the researcher to adjust the mean scores to compensate for any lack of original equivalency between groups. Pearson Product-Moment coefficients of correlation were computed between each of the covariates and the dependent variables. Those that had appreciable linear relationships were chosen as covariates in the analysis of covariance procedure.

Hypotheses 5 through 10: Analysis of covariance was used in comparing mean differences between the control group and each of the three treatment groups on both knowledge test and attitude scale.

Multiple Comparison Procedure. To compare the effectiveness of three instructional approaches in knowledge gain and attitude change, the Scheffe method of multiple comparison (post hoc analysis) was employed. This procedure was used to determine whether treatment effects were present.

The Scheffe method of multiple comparisons is generally used when the distribution of N among the groups is not equal. This method has greater sensitivity when complex combinations of means are being estimated.
CHAPTER IV

RESULTS AND DISCUSSION

The fundamental purpose of the study was to ascertain the effects of three different instructional approaches to achieve changes in knowledge and attitudes of culturally unique adults during a learning project on weight modification. Results are presented with reference to demographic variables as they relate to the paraprofessionals who participated in the study and to hypotheses formulated in Chapter I.

Data were collected on four demographic variables prior to pretesting the experimental subjects. Included in these variables were age, years of formal education and number of years employed with the Expanded Food and Nutrition Education Program. Mean age, education and employment are summarized in Table 3.

The control, correspondence instruction and discussion-laboratory groups had similar means for age. Nutrition Aides in the discussion-gaming group were older while those in the correspondence instruction group had greater variability. Aides in the control, correspondence instruction and discussion-gaming groups had approximately 12 years of schooling while those in the discussion-laboratory group had 11. Aides in the correspondence instruction and discussion-laboratory
groups had greater variability in terms of education when compared with the control and discussion-gaming groups. Aides in the discussion-laboratory group had more employment tenure than those in the other three groups. Aides in the control group were the least tenured. Aides in the control and discussion-gaming groups had greater variability in terms of employment tenure when compared with the correspondence instruction and discussion-laboratory groups.

Linear relationships between the dependent variable, posttest scores on the knowledge test and attitude scale, and the four possible control variables: age, education, years in EFNEP, and pretest scores on the knowledge test and attitude scale, were established prior to use as covariates in the statistical analysis procedures.

The extent of participation in educational activities not related to employment and their relationship to pretest and posttest scores on

Table 3
PERSONAL DATA FOR EXPERIMENTAL SUBJECTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control N=13</th>
<th>Correspondence Instruction N=17</th>
<th>Discussion-Laboratory N=15</th>
<th>Discussion-Gaming N=16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>44.69*</td>
<td>45.35</td>
<td>44.75</td>
<td>47.75</td>
</tr>
<tr>
<td></td>
<td>± 8.31</td>
<td>±11.69</td>
<td>± 8.35</td>
<td>± 9.90</td>
</tr>
<tr>
<td>Education</td>
<td>11.92</td>
<td>11.75</td>
<td>11.00</td>
<td>12.13</td>
</tr>
<tr>
<td></td>
<td>± 1.12</td>
<td>± 1.84</td>
<td>± 2.07</td>
<td>± 1.20</td>
</tr>
<tr>
<td>Employment</td>
<td>5.09</td>
<td>6.31</td>
<td>6.86</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td>± 2.61</td>
<td>± 1.91</td>
<td>± 1.91</td>
<td>± 2.67</td>
</tr>
</tbody>
</table>

* mean ± standard deviation
both knowledge test and attitude scale are found in Table 4. Inspection of data in this table suggests that for the discussion-laboratory and discussion-gaming groups, pretest and posttest scores on both knowledge test and attitude scale were higher among respondents who participated in some form of educational activity not related to their job. In the correspondence instruction group, pretest and posttest scores on both knowledge test and attitude scale were consistently higher among respondents who did not participate in educational activities not related to their job. In the control or no treatment group, only on prior attitude measures were scores higher among respondents who did not participate in educational activities. Types of educational activities mentioned by the respondents were:

1. La Leche League workshops
2. Head Start educational programs
3. Parent Teacher Association activities
4. Community evening programs such as Adult Basic Education
5. Community college sponsored programs
6. Youth programs such as 4-H
7. Religious education programs
8. Leadership and management training programs

An adult's approach to learning reflects recency of educational experience. Findings from studies on the influence of educational background of the adult education participant on learning outcomes suggest that adults who have not recently participated in an educational activity or who do not have a high level of formal education are not able to perform as well in a learning situation as those who
Table 4

PARTICIPATION IN EDUCATIONAL ACTIVITIES NOT RELATED TO EMPLOYMENT

<table>
<thead>
<tr>
<th></th>
<th>CONTROL N=13</th>
<th>CORRESPONDENCE INSTRUCTION N=17</th>
<th>DISCUSSION-LABORATORY N=15</th>
<th>DISCUSSION-GAMING N=16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participated</td>
<td>Did Not</td>
<td>Participated</td>
<td>Did Not</td>
</tr>
<tr>
<td></td>
<td>N=8</td>
<td>N=5</td>
<td>N=8</td>
<td>N=9</td>
</tr>
<tr>
<td>Knowledge pretest</td>
<td>18.63±3.11</td>
<td>14.80±1.79</td>
<td>16.75±3.24</td>
<td>17.11±4.05</td>
</tr>
<tr>
<td>Knowledge posttest</td>
<td>18.00±2.83</td>
<td>16.20±2.59</td>
<td>18.75±4.40</td>
<td>18.89±4.14</td>
</tr>
<tr>
<td>Prior attitude measure</td>
<td>153.13±15.54</td>
<td>156.20±9.68</td>
<td>147.38±12.46</td>
<td>149.89±17.32</td>
</tr>
<tr>
<td>Post attitude measure</td>
<td>155.13±20.05</td>
<td>154.40±7.57</td>
<td>147.63±11.43</td>
<td>152.00±18.43</td>
</tr>
</tbody>
</table>

* mean ± standard deviation
have been recently involved in some educational activity or who have a high level of formal education (Grotelueschen, 1972). In general, the extent of participation in continuing education and information-seeking activities is largely associated with level of education, age and sense of educational efficacy (Knox, 1977). Previous learning experience which has been successful and satisfactory can assist adult learners to be more receptive to change and seek more challenging learning episodes.

Testing the Hypotheses

The assumption of no differences between groups enabled the investigator to test hypotheses in terms of probability.

Hypothesis 1

Knowledge gain was evaluated by comparing pretest and posttest mean scores for treatment and control groups. The null hypothesis that relates to this comparison is stated as follows: "There will be no significant difference between the pretest means and posttest means of the four experimental groups on the knowledge test."

To determine whether the observed difference between initial and final measures for each subject within each experimental group can be attributed to the effect of training, a t-test of significant differences was used. This statistical procedure involved the use of the t-test for correlated or paired means since subjects were measured twice.

The comparison of correlated means is summarized in Table 5. These data show the differences between mean scores obtained by the
four experimental groups on the knowledge pretest and the mean scores obtained by the same groups on the posttest following the conclusion of the training period.

Table 5

T-TESTS COMPARING PRETEST MEAN WITH POSTTEST MEAN FOR FOUR EXPERIMENTAL GROUPS ON A KNOWLEDGE TEST OF CONCEPTS RELATED TO WEIGHT MODIFICATION

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>Difference</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>17.1538</td>
<td>17.3077</td>
<td>.1539</td>
<td>12</td>
<td>0.16</td>
</tr>
<tr>
<td>Correspondence</td>
<td>16.9412</td>
<td>18.8235</td>
<td>1.8824</td>
<td>16</td>
<td>3.02*</td>
</tr>
<tr>
<td>Instruction</td>
<td>15.5333</td>
<td>18.4667</td>
<td>2.9333</td>
<td>14</td>
<td>3.74*</td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>17.4375</td>
<td>19.1250</td>
<td>1.6875</td>
<td>15</td>
<td>2.06</td>
</tr>
</tbody>
</table>

*p < .05

It is evident that significant changes between pretest and posttest mean scores on the knowledge test occurred in the correspondence instruction and discussion-laboratory groups. It can be inferred that there was significant gain in knowledge of the concepts presented as a result of the training activity for both correspondence instruction and discussion-laboratory groups. However, the larger mean difference favors the discussion-laboratory group. In the discussion-gaming group, a noticeable but not statistically significant increase between pretest and posttest mean scores occurred. It is worthwhile to
note that changes in mean scores were in the desired direction. Since the value obtained by the analysis falls below the critical value of $t$ in a two-tailed test (2.228 for 10 df and 2.16 for 13 df) for both the control and discussion-gaming groups, the null hypothesis was rejected for the correspondence instruction and discussion-laboratory groups and accepted for the control and discussion-gaming groups. It was established that in both the correspondence instruction and discussion-laboratory groups, there was facilitation of learning during the training period.

**Hypothesis 2**

Attitude change was evaluated by comparing pretest and posttest mean scores of the four experimental groups. The null hypothesis is stated as follows: "There will be no significant difference between the pretest means and posttest means of the four experimental groups on the attitude scale."

The comparison of correlated means is found in Table 6. These data show the differences between pretest mean scores obtained by the four experimental groups and posttest mean scores obtained by the same groups following the training period.

Analysis of the data presented in Table 6 showed no significant difference between subject means on the initial and final measure of attitude change within each of the four experimental groups. Therefore, the null hypothesis was sustained. It can be inferred that attitude change did not occur during the training period that lasted for three weeks. This evidence supports the position of Partin (1967) in a thesis on discussion procedures for changing attitudes.
Table 6

T-TEST COMPARING PRETEST MEAN WITH POSTTEST MEAN FOR FOUR EXPERIMENTAL GROUPS ON CONCEPTS MEASURED BY A LIKERT-TYPE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>Difference</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>154.3077</td>
<td>154.8461</td>
<td>.5385</td>
<td>12</td>
<td>.28</td>
</tr>
<tr>
<td>Correspondence Instruction</td>
<td>148.7059</td>
<td>149.9412</td>
<td>1.2353</td>
<td>16</td>
<td>.75</td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>153.7333</td>
<td>152.9333</td>
<td>.8000</td>
<td>14</td>
<td>.40</td>
</tr>
<tr>
<td>Discussion-Gaming</td>
<td>147.1875</td>
<td>148.9375</td>
<td>1.7500</td>
<td>15</td>
<td>.77</td>
</tr>
</tbody>
</table>

P < .05

Hypotheses 3a and 3b

In order to determine the treatment effect of type of instructional approach, the analysis of covariance procedure was employed. The basic principle of this analysis is that there are measures of one or more antecedent or control variables taken in the hope that the linear association between them and the criterion or dependent variable are appreciable. Control variables with a moderate to very high degree of relationship with the criterion variable were used in the analysis of covariance as covariates. Correlation coefficients can be described according to the following:

- Very high \( r \) = .80 or above
- Strong \( r \) = .60 to .80
- Moderate \( r \) = .40 to .60
Correlation coefficients were computed between scores on the knowledge posttest and age, education, years of employment and scores on the pretest. A moderate degree of relationship was found to exist between pretest and posttest scores on the knowledge test and between years of education and posttest scores as shown in Table 7. Therefore, pretest scores and years of education were used as covariates in the analysis of covariance used to test hypotheses 3a and 3b. Both age and years in EFNEP were inversely related to posttest scores on the knowledge test. Younger subjects who had less employment tenure obtained higher scores on the posttest. Age and years of employment were not used as covariates in the analysis of covariance because of their weak relationship to the criterion variable, posttest scores on the knowledge test.

Table 7

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>61</td>
<td>- .30</td>
<td>.009*</td>
</tr>
<tr>
<td>Education</td>
<td>60</td>
<td>.48</td>
<td>.001*</td>
</tr>
<tr>
<td>Employment</td>
<td>61</td>
<td>- .34</td>
<td>.004*</td>
</tr>
<tr>
<td>Pretest scores</td>
<td>61</td>
<td>.60</td>
<td>.001*</td>
</tr>
</tbody>
</table>

*p < .05
The three treatment groups were compared for knowledge gain while equating the groups on prior relevant knowledge. Hypothesis 3a is stated in the null form as follows: "There will be no significant difference between the posttest means of the three treatment groups on the knowledge test when initial differences between the groups have been adjusted with respect to prior relevant knowledge."

When the posttest means of the three treatment groups were compared while equating the groups on prior relevant knowledge, there was a significant difference found between the groups as presented in Table 8. Since the computed $F$ value of 12.23 was significant at the .001 level, the null hypothesis was rejected.

Table 8

ANALYSIS OF COVARIANCE COMPARING KNOWLEDGE POSTTEST SCORES OF THREE TREATMENT GROUPS CONTROLLING FOR PRIOR KNOWLEDGE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of freedom</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>$F$ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>308.91</td>
<td>102.97</td>
<td>12.23*</td>
</tr>
<tr>
<td>Within</td>
<td>44</td>
<td>370.40</td>
<td>8.42</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>679.31</td>
<td>14.45</td>
<td></td>
</tr>
</tbody>
</table>

$^{*} p < .001$

It was necessary to inspect the adjusted criterion means to determine which treatment group was significantly better and more effective. Note in Table 9 how the original criterion means have been
adjusted to compensate for initial differences between the groups on pretest achievement. The adjustment of the criterion means was rather slight. Multiple $R^2$ found in Table 9 means 45.5 percent of the variation in posttest scores on the knowledge test was explained by the additive effects of the type of instructional approach experienced and the knowledge pretest.

Explanation of adjusted treatment means may be found in Figure 1. This illustrates the points, $\bar{X}$ and $\bar{Y}$, for the three adjusted criterion means on the knowledge posttest. Through each of these points, a regression line is drawn. In this way, the adjusted criterion means on the knowledge posttest of the three treatment groups are made to be comparable with respect to the covariate, knowledge pretest scores.

Table 9

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Posttest scores</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Correspondence</td>
<td>17</td>
<td>18.61</td>
<td>18.82</td>
</tr>
<tr>
<td>Instruction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>15</td>
<td>19.34</td>
<td>18.46</td>
</tr>
<tr>
<td>Discussion-Gaming</td>
<td>16</td>
<td>18.53</td>
<td>19.12</td>
</tr>
</tbody>
</table>

Multiple $R^2 = .455$
Figure 1, Representation of Adjusted Criterion (Treatment) Means on the Knowledge Test Using Pretest Scores as the Covariate
Since there were three posttest means for the knowledge test, the investigator wished to answer the question of which differences between adjusted criterion means were significant. Using the Scheffé method of performing post hoc comparisons among means, six different contrasts were tested for significant differences. Data summarized in Table 10 show that the ratios obtained were less than the absolute value of the test statistic. This indicates that none of the pairs of differences or contrasts between adjusted criterion means on the knowledge test were significantly different. Results suggested no statistical differences among the three types of instructional approaches used in a training component for paraprofessionals on weight modification. All three approaches were effective in facilitating learning. This is consistent with the results of the t-test used in testing hypothesis 1.
Table 10

Scheffe Method of Multiple Comparisons Using Adjusted Criterion
Means of Three Treatment Groups on the Knowledge Test

<table>
<thead>
<tr>
<th>Contrast</th>
<th>Estimate of Contrast ($\hat{\psi}$)</th>
<th>Estimate of Variance of Contrast ($\hat{\sigma}^2$)</th>
<th>Positive Square Root of Estimate of Variance of Contrast ($\hat{\sigma}$)</th>
<th>Ratio ($\hat{\psi}/\hat{\sigma}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. $\mu_2 - \mu_3$</td>
<td>-.73</td>
<td>1.044</td>
<td>1.022</td>
<td>-.71</td>
</tr>
<tr>
<td>B. $\mu_2 - \mu_4$</td>
<td>.08</td>
<td>1.010</td>
<td>1.005</td>
<td>.08</td>
</tr>
<tr>
<td>C. $\mu_3 - \mu_4$</td>
<td>.81</td>
<td>1.077</td>
<td>1.038</td>
<td>.78</td>
</tr>
<tr>
<td>D. $\mu_2 - \frac{\mu_3 + \mu_4}{2}$</td>
<td>-.33</td>
<td>.766</td>
<td>.875</td>
<td>-.38</td>
</tr>
<tr>
<td>E. $\mu_3 - \frac{\mu_2 + \mu_4}{2}$</td>
<td>.77</td>
<td>.817</td>
<td>.904</td>
<td>.85</td>
</tr>
<tr>
<td>F. $\mu_4 - \frac{\mu_2 + \mu_3}{2}$</td>
<td>-.45</td>
<td>.791</td>
<td>.889</td>
<td>-.52</td>
</tr>
</tbody>
</table>

Group II - correspondence instruction $\bar{x} = 18.61$ $n = 17$
Group III - discussion-laboratory $\bar{x} = 19.34$ $n = 15$
Group IV - discussion-gaming $\bar{x} = 18.53$ $n = 16$

$\frac{MS}{w} = 8.418$

Test statistic $= \sqrt{2, (F.95, 2, 46)} = 2.53$
The three treatment groups were compared for knowledge gain while equating the groups on years of formal education. Hypothesis 3b is stated in the null form as follows: "There will be no significant difference between the posttest means of the three treatment groups on the knowledge test when initial differences between the groups have been adjusted with respect to education."

Table 11

ANALYSIS OF COVARIANCE COMPARING POSTTEST SCORES OF THREE TREATMENT GROUPS ON A KNOWLEDGE TEST OF CONCEPTS RELATED TO WEIGHT MODIFICATION USING YEARS OF EDUCATION AS COVARIATE

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>180.85</td>
<td>60.28</td>
<td>5.46</td>
</tr>
<tr>
<td>Within</td>
<td>43</td>
<td>474.81</td>
<td>11.04</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>655.66</td>
<td>14.25</td>
<td></td>
</tr>
</tbody>
</table>

*<br>\( p < .003 \)

When posttest means of the three treatment groups were compared controlling for education, significant differences between them were observed. The data presented in Table 11 show an \( F \) value of 5.46 which was sufficiently high to reject the null hypothesis at the .05 level of significance.

From data in Table 12, the investigator indicated that 27.6 percent of the variation in posttest scores on the knowledge test was
explained by the additive effects of the type of instructional approach experienced and years of formal education. It is suggested that when the three treatment groups were equated on years of formal education, there were significant differences between them.

Table 12

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Posttest scores</th>
<th>Years of education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Correspondence Instruction</td>
<td>16</td>
<td>18.97</td>
<td>19.12</td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>15</td>
<td>19.24</td>
<td>18.46</td>
</tr>
<tr>
<td>Discussion-Gaming</td>
<td>16</td>
<td>18.54</td>
<td>19.12</td>
</tr>
</tbody>
</table>

Multiple $R^2 = .276$

Hypothesis 4

Correlation coefficients were computed between post attitude measures and age, education, duration of employment, and prior attitude measures. A very high relationship was found to exist between pretest and posttest scores on the attitude scale as shown in Table 13. In the analysis of covariance, prior attitude measure was used as the covariate.
The fourth hypothesis is stated in the null form as follows:
"There will be no significant difference between the posttest means of the three treatment groups on the attitude scale when initial differences between the groups have been adjusted with respect to prior attitude measure."

Table 13

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>61</td>
<td>-.13</td>
<td>.167</td>
</tr>
<tr>
<td>Education</td>
<td>60</td>
<td>.26</td>
<td>.022*</td>
</tr>
<tr>
<td>Employment</td>
<td>61</td>
<td>-.22</td>
<td>.044*</td>
</tr>
<tr>
<td>Pretest Scores</td>
<td>61</td>
<td>.89</td>
<td>.001*</td>
</tr>
</tbody>
</table>

* P < .05

Significant differences were observed when posttest means of the treatment groups were compared. The investigator indicated that from data summarized in Table 14, the computed value of \( \bar{F} \), 56.38, was significant at the .001 level therefore, the null hypothesis was rejected.
Table 14

ANALYSIS OF COVARIANCE COMPARING POST ATTITUDE MEASURES OF THREE TREATMENT GROUPS CONTROLLING FOR PRIOR ATTITUDE MEASURES

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Degrees of freedom</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>10081.28</td>
<td>3360.43</td>
<td>56.38*</td>
</tr>
<tr>
<td>Within</td>
<td>44</td>
<td>2622.57</td>
<td>59.60</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>12703.85</td>
<td>270.30</td>
<td></td>
</tr>
</tbody>
</table>

* p < .001

From the analysis of data summarized in Table 15 the investigator indicated how original criterion means have been adjusted to compensate for initial differences between treatment groups on prior attitude measures. Approximately 80 percent of the variation in posttest scores on the attitude scale was explained by the additive effects of type of instructional approach experienced and prior attitude measure. The attempt in training becomes one of making attitude changes toward more flexibility in the practice of nutrition related to weight modification. Interestingly, in the three treatment groups, attitudes were toward the desired direction as reflected by the mean scores on both pretest and posttest which ranged from 147.19 to 153.73. The highest possible score of 200 on the attitude test means great flexibility whereas, the lowest possible score of 40 means extreme rigidity in attitude. The correspondence instruction and
discussion-gaming groups rated all attitude scales toward more flexibility following the training period than preceding. However, the discussion-laboratory group had higher means on prior attitude measures than post attitude measures. This evidence partially supports the findings of Hill (1960) in his discussion-lecture experiments which indicate that neither method had much effect on the mean attitude of groups in the study.

Table 15
CRITERION AND CONTROL VARIABLE MEANS USED IN THE ANALYSIS OF COVARIANCE COMPARING POST ATTITUDE MEASURES OF THREE TREATMENT GROUPS

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Criterion Post attitude measure</th>
<th>Control Prior attitude measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Correspondence Instruction</td>
<td>17</td>
<td>150.87</td>
<td>149.94</td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>15</td>
<td>149.48</td>
<td>152.93</td>
</tr>
<tr>
<td>Discussion-Gaming</td>
<td>16</td>
<td>151.19</td>
<td>148.94</td>
</tr>
</tbody>
</table>

Multiple $R^2 = .794$

Figure 2 illustrates the points, $\overline{X}$ and $\overline{Y}$, for the adjusted criterion means on the attitude scale. The adjusted criterion means of the three treatment groups on post attitude measures are made
Figure 2. Representation of Adjusted Criterion (Treatment) Means on the Attitude Scale Using Prior Attitude Measures as the Covariate
comparable with respect to the covariate, scores on prior attitude measures.

Using the Scheffé method, six different contrasts were tested for significant differences. Data summarized in Table 16 show that the ratios obtained were less than the absolute value of the test statistic. This indicates that none of the pairs of differences between adjusted criterion means on the attitude scale were significantly different. The three training approaches were equally not influential in changing attitudes toward the practice of nutrition related to weight modification.

Hypothesis 5

Two experimental groups were compared for knowledge gain following a training activity on weight modification. The fifth null hypothesis is stated as follows: "There will be no significant difference between the posttest means of the correspondence instruction and control groups on the knowledge test when initial differences between the groups have been adjusted with respect to prior knowledge."

When the posttest means of the correspondence instruction and control groups were compared using the analysis of covariance to adjust the criterion means while equating on prior relevant knowledge, there was a significant difference observed between them as summarized in Table 17. The computed F value, 11.01, exceeded the critical F value required for significance at the .05 level. The null hypothesis was rejected and it could be inferred that the effect of correspondence instruction in facilitating learning of weight modification concepts
during the training period was statistically significant. This supports the position that older adults learn more effectively when they set their own pace in learning and may they take a break periodically (Knox, 1977).

Table 16
SCHIFFE METHOD OF MULTIPLE COMPARISONS USING ADJUSTED CRITERION MEANS OF THREE TREATMENT GROUPS ON THE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Contrast</th>
<th>Estimate of Contrast $\hat{\psi}$</th>
<th>Estimate of Variance of Contrast $\sigma^2_{\hat{\psi}}$</th>
<th>Positive Square Root of Estimate of Variance of Contrast $\hat{\sigma}_{\hat{\psi}}$</th>
<th>Ratio $\hat{\psi}/\hat{\sigma}_{\hat{\psi}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. $\mu_2 - \mu_3$</td>
<td>1.39</td>
<td>7.391</td>
<td>2.718</td>
<td>.51</td>
</tr>
<tr>
<td>B. $\mu_2 - \mu_4$</td>
<td>-.32</td>
<td>7.152</td>
<td>2.673</td>
<td>-.12</td>
</tr>
<tr>
<td>C. $\mu_3 - \mu_4$</td>
<td>-1.71</td>
<td>7.628</td>
<td>2.762</td>
<td>-.62</td>
</tr>
<tr>
<td>D. $\mu_2 - \frac{\mu_3 + \mu_4}{2}$</td>
<td>.53</td>
<td>5.424</td>
<td>2.329</td>
<td>.23</td>
</tr>
<tr>
<td>E. $\mu_3 - \frac{\mu_2 + \mu_4}{2}$</td>
<td>-1.55</td>
<td>5.781</td>
<td>2.404</td>
<td>-.64</td>
</tr>
<tr>
<td>F. $\mu_4 - \frac{\mu_2 + \mu_3}{2}$</td>
<td>1.01</td>
<td>5.603</td>
<td>2.367</td>
<td>-.27</td>
</tr>
</tbody>
</table>

Group II - correspondence instruction $\bar{X} = 150.87$ $n = 17$
Group III - discussion-laboratory $\bar{X} = 149.48$ $n = 15$
Group IV - discussion-gaming $\bar{X} = 151.19$ $n = 16$

$MS_w = 59.60$

Test statistic $= \sqrt{2, (F_{2,46})} = 2.53$
Table 17
COMPARISON OF POSTTEST SCORES BETWEEN THE CORRESPONDENCE INSTRUCTION GROUP AND THE CONTROL GROUP ON A KNOWLEDGE TEST OF CONCEPTS RELATED TO WEIGHT MODIFICATION

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Degrees of freedom</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>171.69</td>
<td>85.85</td>
<td>11.01*</td>
</tr>
<tr>
<td>Within</td>
<td>27</td>
<td>210.48</td>
<td>7.80</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>382.17</td>
<td>13.18</td>
<td></td>
</tr>
</tbody>
</table>

* $P < .001$

A difference in the adjusted criterion mean scores was noted in Table 18. The control group's unadjusted original mean has been slightly decreased while the correspondence instruction group's original mean has been adjusted upward. A higher adjusted mean score is indicative of the positive effect of type of instructional approach on knowledge improvement.
Table 18
CRITERION AND CONTROL VARIABLE MEANS USED IN THE ANALYSIS OF COVARIANCE COMPARING POSTTEST SCORES ON THE KNOWLEDGE TEST

<table>
<thead>
<tr>
<th>Group</th>
<th>Criterion</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posttest</td>
<td>Pretest</td>
</tr>
<tr>
<td></td>
<td>Scores</td>
<td>Scores</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Control</td>
<td>17.23</td>
<td>17.15</td>
</tr>
<tr>
<td>Correspondence</td>
<td>17.31</td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td>18.89</td>
<td>16.94</td>
</tr>
<tr>
<td></td>
<td>18.83</td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 6

Two experimental groups were compared on attitude change resulting from a specific training approach used in the study. The sixth null hypothesis is worded as follows: "There will be no significant difference between the posttest means of the correspondence instruction and control groups on the attitude test when initial differences between the groups have been adjusted with respect to prior attitude measure."

When the posttest means of the correspondence instruction and control groups were compared using the analysis of covariance to adjust the criterion means while prior attitude measures were held constant, there was a significant difference observed between them as noted in Table 19. A significant $F$ value, 58.67, was yielded.
Table 19

COMPARISON OF POSTTEST SCORES BETWEEN THE CORRESPONDENCE INSTRUCTION GROUP AND THE CONTROL GROUP ON CONCEPTS MEASURED BY A LIKERT-TYPE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>5638.48</td>
<td>2819.24</td>
<td>58.67*</td>
</tr>
<tr>
<td>Within</td>
<td>27</td>
<td>1297.36</td>
<td>48.05</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>6935.84</td>
<td>239.17</td>
<td></td>
</tr>
</tbody>
</table>

*p < .001

Therefore, the null hypothesis was rejected. Data in Table 20 show a difference in the adjusted criterion or dependent variable means. The direction of the difference favored the group that participated in correspondence instruction.

Table 20

CRITERION AND CONTROL VARIABLE MEANS USED IN THE ANALYSIS OF COVARIANCE COMPARING POSTTEST SCORES ON THE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post attitude measure</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted   Unadjusted</td>
<td>Prior attitude measure</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>151.72     154.85</td>
<td>154.31</td>
</tr>
<tr>
<td>Correspondence Instruction</td>
<td>17</td>
<td>152.34   149.94</td>
<td>148.71</td>
</tr>
</tbody>
</table>
Hypothesis 7

Two groups were compared for knowledge gain following a training activity on weight modification. The seventh null hypothesis is stated as follows: "There will be no significant difference between the posttest means of the discussion with laboratory experience and control groups of the knowledge test when initial differences between the groups have been adjusted with respect to prior knowledge."

When the posttest means of the discussion-laboratory and control groups were compared using the analysis of covariance while controlling for prior knowledge, there was a significant difference between them as indicated in Table 21.

Table 21

COMPARISON OF POSTTEST SCORES BETWEEN THE DISCUSSION-LABORATORY GROUP AND THE CONTROL GROUP ON A KNOWLEDGE TEST OF CONCEPTS RELATED TO WEIGHT MODIFICATION

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of squares</th>
<th>Mean Square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>60.42</td>
<td>30.21</td>
<td>4.03*</td>
</tr>
<tr>
<td>Within</td>
<td>25</td>
<td>187.44</td>
<td>7.50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>247.86</td>
<td>9.18</td>
<td></td>
</tr>
</tbody>
</table>

* p < .03
The computed \( F \) value, 4.03, was sufficiently high to reject the null hypothesis at the .05 level of significance. The direction of the difference favored the discussion-laboratory group. This was noted in comparing the adjusted criterion means as summarized in Table 22. It could be inferred that a gain in knowledge occurred during the training period and the discussion-laboratory group was statistically significant in facilitating learning of weight modification concepts.

Table 22

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Criterion Posttest Scores</th>
<th>Control Pretest Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>16.92</td>
<td>17.31</td>
</tr>
<tr>
<td>Discussion-Laboratory</td>
<td>15</td>
<td>18.80</td>
<td>18.47</td>
</tr>
</tbody>
</table>

Hypothesis 8

Two experimental groups were compared on attitude change resulting from a specific training approach used in the study. The null hypothesis is worded as follows: "There will be no significant difference between the posttest means of the discussion with laboratory experience and control groups on the attitude test when initial
differences between the groups have been adjusted with respect to prior attitude measures."

When the posttest means of the discussion-laboratory group and the control groups were compared using the analysis of covariance while controlling for prior attitude measure, there was a significant difference as shown by the data found in Table 23. A significant $F$ value, 34.69, was yielded. Therefore, the null hypothesis was rejected.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>$F$ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>3891.84</td>
<td>1945.92</td>
<td>34.69*</td>
</tr>
<tr>
<td>Within</td>
<td>25</td>
<td>1402.25</td>
<td>56.09</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>5294.09</td>
<td>196.08</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .001$

Data summarized in Table 24 show a difference in adjusted criterion of dependent variable means. The difference favored the control group. It could be inferred that the discussion-laboratory approach did not influence attitude change toward flexibility in the practice of nutrition related to weight modification.
<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post attitude measure</th>
<th>Prior attitude measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>154.53</td>
<td>154.84</td>
</tr>
<tr>
<td>Discussion-</td>
<td>15</td>
<td>153.21</td>
<td>152.93</td>
</tr>
<tr>
<td>Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hypothesis 9**

Two experimental groups were compared for knowledge gain following a training activity on weight modification. The null hypothesis is stated as follows: "There will be no significant difference between the discussion with gaming experience and control groups on knowledge gain following the training period after equating on prior relevant knowledge."

When the posttest mean scores of the discussion-gaming and control groups were compared using the analysis of covariance while controlling for prior relevant knowledge, there was a significant difference observed between them as presented in Table 25. The computed F value, 6.60, exceeded the critical F value required for significance at the .05 level. Therefore, the null hypothesis was rejected.
Table 25

COMPARISON OF POSTTEST SCORES BETWEEN THE DISCUSSION-GAMING GROUP AND THE CONTROL GROUP ON A KNOWLEDGE TEST OF CONCEPTS RELATED TO WEIGHT MODIFICATION

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>126.01</td>
<td>63.00</td>
<td>6.60*</td>
</tr>
<tr>
<td>Within</td>
<td>26</td>
<td>248.20</td>
<td>9.55</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>374.21</td>
<td>13.37</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .005$

By inspecting the adjusted criterion means shown in Table 26, it can be seen that the discussion-gaming group performed significantly better than the control group on the knowledge posttest. The results confirm that the discussion with gaming experience approach was effective in facilitating learning of concepts related to weight modification.
Table 26

CRITERION AND CONTROL VARIABLE MEANS USED IN THE ANALYSIS OF COVARIANCE COMPARING POSTTEST SCORES ON THE KNOWLEDGE TEST

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Criterion Posttest Scores</th>
<th>Control Pretest Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>17.40</td>
<td>17.31</td>
</tr>
<tr>
<td>Discussion-Gaming</td>
<td>16</td>
<td>19.05</td>
<td>19.12</td>
</tr>
</tbody>
</table>

Hypothesis 10

Two experimental groups were compared on attitude change toward flexibility in the practice of nutrition related to weight modification resulting from a specific instructional approach used in the study. The hypothesis in the null form is stated as follows:

"There will be no significant difference between the discussion-gaming group and control group on attitude measures following the training period after equating on prior attitude measures."

When the posttest means of the discussion-gaming and control groups were compared using the analysis of variance while controlling for prior attitude measure, there was a significant difference as shown in the data summarized in Table 27. A significant $F$ value, 63.92, was yielded. Therefore, the null hypothesis was rejected.
Table 27

COMPARISON OF POSTTEST SCORES BETWEEN THE DISCUSSION-GAMING GROUP AND CONTROL GROUP ON CONCEPTS MEASURED BY A LIKERT-TYPE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>8252.70</td>
<td>4126.35</td>
<td>63.92*</td>
</tr>
<tr>
<td>Within</td>
<td>26</td>
<td>1678.32</td>
<td>64.55</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>9931.02</td>
<td>354.68</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .001$

Upon inspection of the adjusted criterion means, a slight difference was noted in favor of the discussion-gaming group. Data are summarized in Table 28. It could be inferred that the discussion with gaming experience approach slightly influenced attitude change toward flexibility in the practice of nutrition related to weight modification as compared to a group that did not receive any training.
Table 28
CRITERION AND CONTROL VARIABLE MEANS USED IN THE ANALYSIS OF COVARIANCE COMPARING POSTTEST SCORES ON THE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post attitude measure</th>
<th>Prior attitude measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjusted</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>151.37</td>
<td>154.85</td>
</tr>
<tr>
<td>Discussion-gaming</td>
<td>16</td>
<td>151.77</td>
<td>148.94</td>
</tr>
</tbody>
</table>

From the overall findings the investigator indicated that correspondence instruction and discussion using laboratory application activities were effective in facilitating and bringing about desirable learning outcomes among disadvantaged adult learners. However, neither of the three approaches seemed adequate for causing significant changes in attitude toward flexibility and adaptability in the practice of nutrition related to weight modification. These findings are subject to the limitations imposed by the selection of the subjects and the relatively short duration of the study.
The purpose of this study was to determine the effects of three experimentally manipulated instructional approaches on knowledge gain and attitude change of disadvantaged adult learners during a training program on weight modification. The major objectives for the training were to increase knowledge and understanding of concepts related to weight modification and to improve the attitudes of paraprofessionals toward the practice of nutrition.

The major focus on the literature review was to determine which instructional approaches would most effectively bring about desired results in adult education settings. Methodology studies done with groups of disadvantaged adult learners were reviewed.

The sixty-one subjects who participated in the study were Nutrition Aides in eight metropolitan counties in Ohio. A control and three experimental treatments were randomly assigned to the eight pre-assembled groups. The control group did not receive any training on weight modification but took the pretest and posttest. The correspondence instruction group participated in a six lesson course using a self study format in which members worked on individual
lesson assignments. The discussion with laboratory experience group was presented content information followed by group discussion and laboratory application activities. The group identified as discussion with gaming experience used a learning game to reinforce concepts presented at the beginning of each training session.

Data for testing the ten hypotheses formulated in the study were obtained from pretest and postest administration of a 30 item four-choice multiple choice test on content studied and a 40 item Likert-type attitude scale. Data on demographic variables collected prior to administration of the pretest were also used for testing hypotheses.

The design of this quasi-experiment including three treatment groups and one control group was a non-equivalent control group design. The treatment period lasted three weeks. Two treatment groups using discussion techniques met once a week and received instruction from the investigator. Their training consisted of a total of eight hours. Two lessons were mailed to the correspondence instruction group each week during the three week training period. The basic content and sequence of each component in the learning project on weight modification was identical for the three treatment groups. The control group received no training in weight modification for the duration of the study.

Data were tested for significance of differences between means. T-tests for correlated means were computed since the initial and final measures represent correlated scores. F-values were computed for the variances of groups being compared. The Scheffé method of performing post hoc comparisons among means was employed to test whether the three instructional approaches were different in effectiveness. Hypotheses
were rejected if the differences between means attained the .05 level of significance.

Ten hypotheses were tested and the major statistical findings of the study were:

1. Acquisition of knowledge in a learning project on weight modification was significant within the correspondence instruction and discussion-laboratory groups. However, neither discussion-gaming nor the control groups had significant differences between pretest and posttest scores on the knowledge test.

2. Overall attitude toward flexibility in the practice of nutrition related to weight modification did not seem to improve significantly due to any of the three instructional approaches and the no treatment condition of the control group.

3. When pretest scores on the knowledge test and years of formal education were used as covariates, significant differences were found across the three treatment groups. Post hoc analyses (Scheffé) using adjusted criterion means on the knowledge test failed to identify between which groups the significance existed. None of the pairs of differences between adjusted criterion means were statistically significant.

4. The analysis of data obtained from post attitude measures, covarying prior attitude measures, revealed that significant differences existed across the three treatment groups. Post hoc analysis using the Scheffé method of multiple comparisons among adjusted criterion means indicated that none of the pairs of contrasts were statistically significant.
5. Three analyses of covariance were employed using data from posttest scores on the knowledge test and comparing each of the three treatment groups with the control group. When prior relevant knowledge was used as the covariate, statistically significant differences were found between each treatment group and the control group.

6. Three analyses of covariance were employed using data obtained from post attitude measures and comparing each of the three treatment groups with the control group. When prior attitude measure was used as a covariate, significant differences were found between each treatment group and the control group.

Conclusions

On the basis of the experimental use of three types of instructional approaches in a training component on weight modification for selected paraprofessionals representing disadvantaged adult learners and within the limitations of the study, the following conclusions are presented:

1. Each of the instructional approaches facilitated learning among the paraprofessionals who participated in the training program. However, knowledge gain made by the correspondence instruction and discussion with laboratory groups was significantly greater than that achieved by the control and discussion with gaming experience groups. In the discussion with gaming experience group, posttest scores indicated an increase in knowledge gained though the difference was not statistically significant. In the laboratory method of teaching, students were given the opportunity to observe and manipulate materials, equipment and situations pertinent to the area of study.
2. Significant differences were found between each of the three treatment groups and the control group on the knowledge test. Knowledge gain in groups that received a treatment were significantly greater than would have been obtained without exposure to one of the treatments. The no treatment condition of the control group strengthened the investigator's conviction that the independent variable was responsible for the change in the dependent variable on the knowledge test.

3. None of the three instructional approaches was effective in improving attitudes toward flexibility in the practice of nutrition as related to weight modification.

4. Both correspondence instruction and discussion with gaming experience influenced a small positive attitude change toward the practice of nutrition as related to weight modification when compared with a control group that did not receive training.

5. The discussion with laboratory experience approach did not influence attitude change toward flexibility in the practice of nutrition as related to weight modification.

6. From the overall findings, it can be said that correspondence instruction, discussion with laboratory experience and discussion with gaming experience could be useful and successful alternatives in training disadvantaged adult learners.
Recommendations

The following recommendations are offered based upon the findings and conclusions inferred from this study:

1. Group discussion has been almost universally accepted as an effective technique in adult education. Further study should be made concerning the use of small group discussion for changing attitudes toward flexibility in the practice of nutrition as related to weight modification. Studies might include the use of inter-personal methods such as case studies, role playing, and behavior modification with disadvantaged adult learners. These studies might yield data that are needed if significant improvement is to be made in the effectiveness of training programs utilizing group dynamics to change attitudes of culturally unique adult learners.

2. Efforts should be made to consider other adult learner characteristics such as personality traits and cognitive style in terms of research designs to effectively tailor instructional approaches to learning patterns.

3. Instructional approaches developed and used for this study should be further refined and evaluated. Focus should be on refining procedures for studying their effectiveness in improving attitudes. It might well be that a more comprehensive study conducted over a longer period of time could demonstrate significant attitude change.

4. Correspondence courses are primarily intended for the independent learner. However, group study plans have been offered where the correspondence course is intended for use in small groups. An instructor
meets with the group at regular intervals to discuss course content. Further study using this group instructional approach with disadvantaged adult learners also warrants consideration.

5. Despite efforts in the area of developing effective approaches to teaching the disadvantaged, success has been limited. This may be because there are teacher behaviors that may work better with the less advantaged. Studies should be conducted on teacher behavior characteristics and their relationship to disadvantaged learners. Determining patterns of teacher behavior may help improve teacher effectiveness.

In summary, the writer believes that future investigation should focus on exploring the learning environment of culturally unique adult learners. A deeper understanding of this learning environment and the psychological factors that affect an adult's desire to learn fills the prescription for success in training the disadvantaged.
APPENDIX A:

LETTERS TO ADULT EFNEP COORDINATORS
AND COUNTY HOME ECONOMISTS
March 14, 1977

TO: Adult EFNEP Coordinators

FROM: Alma M. Saddam

The enclosed test was developed to measure knowledge and attitude gain before and after a series of training lessons on weight modification for a selected group of nutrition aides. The study will attempt to analyze the effectiveness of three instructional approaches namely: correspondence instruction, small group discussion with laboratory experience, and small group discussion with a gaming experience on knowledge gain and attitude change.

When giving the test to you nutrition aides, please use the following guidelines:

1. Preferably have the aides take the test in a group and in your presence. If not possible, the aides can take the test in smaller groups but again, in your presence.

2. The test is in two parts - a 30-item multiple choice test and a 40-item attitude checklist. Please encourage the aides to answer ALL the questions even if they have to guess for the multiple choice test.

3. Try not to spend too much time on the entire test. The aides should be done in about 30 to 40 minutes.

4. Each test will be in a small brown envelope with the aides' name on a slip of paper stapled to it. Distribute as indicated and have each aide after taking the test put it back in same brown envelope. Seal if they want to and take off the slip of paper with their name then collect all envelopes.

5. Please mail all the envelopes to me in one large envelope.

6. Remind the aides that they do not have to put their name on the test instrument.

Thanks once again and I hope you do not run into any difficulties.
March 15, 1977

To: County Agents, Home Economics
   Metropolitan Counties in the Expanded Food and Nutrition Education Program

From: Alma M. Saddam
      Extension Specialist, Nutrition

Dear [Blank]:

As part of the requirements for the doctoral program in Adult Education, I will be doing a study on adult learning. More specifically, this research will attempt to analyze the effectiveness of three instructional approaches, namely: correspondence instruction, small group discussion with "hands on" experience and small group discussion with a gaming experience on cognitive gain and positive attitude change of a selected group of OCES paraprofessionals.

Nutrition aides in the 8 EFNEP metropolitan counties will comprise the sample for the study. A three part series of training lessons on weight modification using the 3 instructional approaches will be the experimental treatment given to the subjects in the study. A pre-test and posttest will also be given as part of the study.

All the adult EFNEP coordinators have been contacted for scheduling the time and place for training.

Hopefully, the training lessons will both help the aides and myself.

Please drop me a note if you have any questions and/or concerns about the study.
APPENDIX B:

LEARNING PROJECT ON WEIGHT MODIFICATION

Training Outlines
Laboratory Application Activities
Game Descriptions
Lesson I - Watch Your Weight

Goals:

1. Understand that body weight can be regulated by a change in eating habits and daily practice of physical activity.
2. Become aware of the benefits of living at desirable weight.
3. Identify the major causes of obesity.

Introduce lesson by pointing out how people rationalize about the reasons for their excess pounds. Whatever the rationale, the fact is that more energy food and drink is consumed than is expended by the overweight.

Show a picture of a scale with energy intake (kilocalories) balanced with energy outgo. Explain what kilo means and what kilocalories are. The 1973 revision of the RDA uses kcal to describe a food calorie. Explain why the kcalories are being used now.

Discuss the benefits of living at desirable weight:

1. Lower death rates among persons staying at their desirable weight; Show tables of best weight established by insurance companies.
2. Later onset of chronic diseases is more prevalent among the overweight; Risks of heart disease, strokes, kidney and gall bladded problems, diabetes are far greater among the overweight.
3. Esthetic satisfaction -- clothes are more becoming on the agile figure.
4. Economic asset from an employer's point of view; because of health risks, some industries hesitate to train the overweight.
5. Psychological advantage -- self-destroying personality traits are observed among overweight girls and also in men.
Explain the major causes of obesity:

1. **Energy imbalance** — more energy input than outgo is usually in direct ratio to added years above age 25; fat cell development in number and cell size; energy needs decrease with increasing age.

2. **Physical inactivity** is a major factor in overweight; Set up routine physical exercise in line with your physical stamina.

3. **Family food patterns** -- with changing lifestyles, changes are needed in eating patterns; change in working conditions, effect of step-saving devices.

4. **Company meals** -- low kilocaloric recipes that supply essential nutrients should replace high energy foods such as cakes and pies; desserts and snacks should take on a new look; good dietary planning means choosing foods to reduce kilocalories with consideration that these foods should contain essential nutrients to meet the body's needs.

Summarize lesson by going over key concepts.
Lesson 2 - Reducing Weight

Goals:

1. Understand the importance of using the daily food guide while on a weight reduction program.
2. Know the kinds of food with low energy value and how to include them in your day's menus.
3. Learn what sugars and concentrated sweets do to your body.
4. Become familiar with standard measurements and serving portions of food.
5. Realize that the kcalorie needs of women are different from men.

Introduce the lesson by explaining the importance of having a complete physical check-up by a medical doctor before attempting to lose a considerable amount of body weight.

Discuss the caloric value of a corresponding one to two pounds weight loss per week. Explain why a 1 to 2 pound/week weight loss is recommended by physicians and nutritionists.

Show how the daily food guide could be used in planning a day's food intake at the 1200 kcalorie level. Relate this to the RDA and typical meal patterns.

List and discuss the energy nutrients:

-- What are they
-- How do they provide energy for the body
-- How much energy do they provide
-- How much of each are we consuming

Discuss the increased use of carbonated beverages, other drinks, and fat-laden snacks:
-- What sugars and concentrated sweets do to our body systems
-- Why sugars and sweets are called "empty kcalories"
-- Alcohol as a source of energy; compare it to the energy nutrients
-- What are wiser snack choices
-- Role that fresh fruits and vegetables play in a weight control program

Standard measurements and serving portions are essential when on a weight modification program.

-- Show measuring equipment
-- What do an ounce, gram, pound and kilo mean
-- Choosing the serving plate

Discuss kcalorie needs of women versus men:

-- Why are they different
-- Relate the difference to their daily food plans
-- Who is the reference man, reference woman as used in the RDA?

Summarize lesson by going over key points.
Lesson 3 - Modifying Eating Habits

Goals:
1. Become aware of how one can limit kcalories when eating out.
2. Learn that there are many ways to cut kcalories during food preparation.
3. Learn how to make meals more appealing while on a reduced kcalorie intake.
4. Be able to use weight tables and select your desirable weight.

Introduce lesson by looking at weight tables and selecting desirable weight for height and body build. Demonstrate what the pinch test is.

Show flip charts to reinforce the following discussion topics:

- When cutting calories, bake, broil or boil
- Trimming visible fat from meat influences calorie content
- Dessert choices are important
- Cut down, not out
- Small amounts of calories add up

Point out other ways of cutting kcalories during food preparation. Stimulate discussion by asking the following questions:

- How would you keep kcalorie level low when eating away from home?
- How would you increase meal appeal while lowering kcalorie intake?

Summarize lesson by reviewing key concepts.
Lesson 4 - Avoid Chubby Infants and Fat Young Children

Goals:
1. Understand that lifetime food habits are formed during infancy and early childhood.
2. Become familiar with ways of making small children enjoy food.
3. Understand human energy needs to meet body processes including growth.
4. Recognize certain environmental and genetic factors that may be related to infant and childhood obesity.

Introduce the lesson by asking group members to share experiences where food was used as a reinforcing agent among infants and children. Discuss the disadvantages of using food as a reward for good behavior.

Stimulate discussion by asking group members to suggest different ways of making small children enjoy food.

-- color
-- texture
-- new food
-- flavor
-- food combinations
-- shape

Discuss each briefly.

Explain human energy needs during the life cycle.

-- at birth
-- at age 5
-- at age 15
-- after age 15
Discuss (briefly) how and when fat cells develop in number and size.

List and discuss some environmental and genetic factors which may contribute to infant and childhood obesity:

-- maternal weight
-- weight gain during pregnancy
-- type of feeding (bottle or breast)
-- physical activity

Summarize by reviewing key concepts.
Lesson 5 - Physical Fitness and The Overweight Person

Goals:
1. Understand how excess body weight adds to the complications of coronary heart disease.
2. Know the two types of excessive fat in the blood system causing alarm to the body.
3. Become aware of what saturated and polyunsaturated fats are in relation to food intake.
4. Understand the importance of physical activity in general fitness and weight control.
5. Identify other risk factors in the incidence of high blood pressure and coronary heart disease.

Introduce the lesson by showing a picture of a fatty deposit called plaque in the arteries. Explain what causes plaque formation and how this leads to a blood clot. Discuss what the degenerative condition, known as atherosclerosis, is.

Point out where the highest risks of coronary heart disease are found.

Identify and discuss risk factors in the incidence of high blood pressure and coronary heart disease.

Explain the two types of excessive fat in the blood system causing alarm:
-- Cholesterol -- what is it, dietary sources, its function in the body

-- Triglycerides -- what are they, their role in the body

Define and differentiate between saturated fats and unsaturated fats. What is being recommended by professionals in medicine and nutrition regarding type and amount of dietary fat?

Using flip charts discuss the following concepts:

-- Exercise is important in a weight control program
-- Energy cost of activities varies
-- Easy ways to increase physical activity
-- How long it would take to "walk off" some calories!

Summarize by reviewing key concepts.
Lesson 6 - Fads and Fad Diets Fool Only the Dieter

Goals:

1. Become familiar with phony reducing diets.
2. Understand the dangers of crash and fad diets.
3. Know the effects of fad diets on the body system.
4. Identify some common misconceptions about weight reduction.
5. Learn to tell a sound reducing diet from a phony one.

Introduce lesson by looking at different crash and fad diets related to weight control. Have members tell and discuss other phony reducing diets.

Fad diets are popular under many names. List names for each type of fad diet.

Discuss the dangers and effects of each on the body:

--- Low carbohydrate
--- High protein
--- High fat
--- Fasting or starvation
--- Drugs and appetite suppressants
--- Other diet gimmicks such as "lecithin - vinegar, kelp & B6 diet"

How does one tell whether a reducing diet is sound or not?

--- indication of quackery
--- indication of being sound or accurate
--- sources of reliable nutrition information.
List and discuss some common misconceptions about weight reduction

-- stomach shrinks during weight reduction
-- glandular malfunction causes most obesity
-- hormone injections make one lose weight
-- eating a lot of fish causes weight loss

Ask group members to list other misconceptions related to weight control and discuss each.

Summarize by reviewing key points.
SUGGESTED LEARNING ACTIVITIES

Laboratory Activities

For Lessons 1 and 2

1. Calculate an average daily kilocalorie intake using a kilocalorie counter. Use sample recall if not possible to obtain one prior to lesson.

2. Using the diagram provided, have group members participate in a Food Sorting Activity where each food item is assigned a number based on it's carbohydrate, protein, and fat content.

3. Have a bowl of cooked vegetable and paper plates available. Ask each group member to place a serving of vegetable on a plate. Compare each to a 1/2 cup standard serving.

4. Using standard measuring equipment, have group members measure the following:
   - 1/2 cup cooked carrots
   - 1/2 cup cooked corn
   - 2 ounces cooked lean meat
   - 3 ounces cooked lean meat
   - 3/4 cup rice or spaghetti
   - small baked potato
   - medium baked potato
   - small apple
   - medium apple

   1/4 cup cottage cheese
   1 ounce ready-to-eat cereal

5. How do standard portions look with different size plates? Use some examples in No. 4 with different plates.

Gaming Experience

1. Divide the group into two teams and have them play the Calorie Game. (See game description.)
**Laboratory Activities**

For Lessons 3 and 4

1. Find out what your right weight should be.
2. Calculate kcalorie intake for the past 24 hours.
3. Calculate how many kcalories you should be eating to lose weight.
4. Using menu 2 in "Money-Saving Meals" - how would you modify to reduce kcalories further?

For Lessons 5 and 6

1. Calculate how much dietary fat should be included in the day's food intake to maintain desirable weight.
   a) How much of the daily fat intake should be from saturated fats?
   b) How much from unsaturated fats?
2. Plan (on paper) your daily schedule for physical activity if you were to be on a weight reduction program. (Use the 100 kcalorie activities as guide.)
3. Evaluate a popular fad diet using tools like the Daily Food Guide and principles of meal planning. (Use checklist to help in the evaluation.)

**Gaming Experience**

1. Play the "Four Food Groups For Better Meals Game" with the following variation: Make foods written under each food group represent only those with lower kcalorie values. (See game description.)
2. Play "Weight Challenge Game" using the team method. (See game description.)
THE CALORIE GAME

Rules of Play

Give each player a total of 2,000 calories. The calories (calorie cards) are used to make food purchases.

Two to six players or teams can play. One player can serve as banker or a person not playing can be the banker.

Each player tosses the dice once to determine which player is first. The player tossing highest number is first to play.

The first player tosses dice. The number he tosses tells him how many spaces to move on the board. If the player lands on a food, he must decide whether he wishes to "buy" the food. If so, he pays the banker the number of calories the board indicates. The player writes down on his Score Sheet the name of the foods purchased and the cost of each. He then looks at the Nutritive Value Charts and marks on his Score Sheet the amount of each nutrient that he obtained with his purchase. He marks out one square for each percent on the chart. (Players do not look at the Nutritive Value Charts before deciding to buy the food they land on, but between their turns they may study the charts.)

A toss of the dice may land a player on a space marked "Win Calories" or "Lose Calories". If so, the player turns up the top card from the corresponding stack ("Win" or "Lose" calories); he must do whatever the card indicates.

A toss of the dice may land a player on a square marked "Wild Food Purchase". If so, the player may buy any single food on the board that he is able to pay for. This purchase is recorded on the Score Sheet the same as any other purchase. The player decides which food to buy without looking at the Nutritive Value chart.

The space with the title THE CALORIE GAME is skipped.

Arrows on the board show the direction that the counters (player pieces) move as they go back and forth on the board.

If the player reaches the end of the board before he runs out of calories he may return to START and continue until he uses up all his calories or until he completely fills his Score Sheet.

If the player runs out of calories before filling the Score Sheet with x's, he does not get any more turns, but he can compete for winner if method No. 2 (see below) is used.

The winner is determined in one of the following ways:

1. The first player to obtain completed Score Sheet (all squares marked out), that is, 100% of every nutrient, wins.

2. After a pre-determined time-period (and every player has had the same number of turns), each player scores one point for each percent square that he has marked on his Score Sheet. (No player can score more than 100 for any one nutrient.) The player with the most points wins.

3. Every player who obtains all nutrient requirements (all percent squares marked out) before he runs out of calories wins.

Created by Hazel Taylor Spitze, developed and distributed by Graphics Company.
Instructions for "THE 4 FOOD GROUPS FOR BETTER MEALS GAME"

"The 4 Food Groups for Better Meals Game" is played similar to the game of Bingo, and is suitable for any age group. Players learn the four food groups as they play.

I. The contents of the game include:
   A. instruction sheet
   B. sample filled-in card
   C. 25 game cards for players
   D. sheet of call numbers
   E. check sheet for the number caller
   F. Daily Food Guide poster (FNS-13)
   G. listing of some foods according to food groups

II. Additional materials required for playing include:
   A. pencil for each player
   B. (optional) small prizes for winners. For example, vegetable or flower seeds, measuring spoons or cups, nutritious canned foods, a package of peanuts, etc. (For groups over 25, expect duplicate winners.)

III. Before the game starts:
   A. cut the numbers apart and put in a box. Mix them well.
   B. Display the Daily Food Guide poster in sight of all players.
   C. Pass out game cards.

IV. Prepare the players:
   A. Discuss the Daily Food Guide and foods that belong in each group. Also discuss foods that fall in the fifth "Other Foods" group. Let players practice naming foods until they seem to know what food belongs in what group. Players should list foods in the appropriate spaces at the bottom of the game card.

   B. Now explain the game. When a food group and number is called, that matches the food group and number on the card, the player writes in the space the name of a food which belongs in that group. For example, when the food group and number "Milk 9" is called, the player might write "cottage cheese" in the space. The player must write a different food in each space, as the food group and number is called.

   C. To win, the player must fill a row across, up-and-down, or on-the diagonal. The winner calls out "Meals".

   D. Cards can be used several times if players cross out or erase old entries.
V. To play the game:
   A. The caller draws numbers from the box one at a time, and calls them out to the players; for example, "Milk 9", Bread-Cereal 64".
   
   B. The caller places each called number in the matching space on the check sheet, and allows time for players to jot down the food name.
   
   C. When a player calls out "Meals," stop the game.
   
   D. The winning player must then call out the food group and number, and foods he wrote in each space. The caller should check to make sure that 1) each number used was actually called, 2) foods are in the right food groups, and 3) there is no duplication of food names on the winner's card. The game may continue for winners 2, 3, 4, etc., or award the prize to the first winner.

VI. Variations:
   After the group has learned the four food groups, try some variation. Make foods written under the Meat Group represent only meat alternates (dry beans, peas; eggs; peanut butter; nuts; etc.); make foods written under the Vegetable-Fruit Group represent only vitamin A (or vitamin C) vegetables and/or fruits.

VII. Additional sets of "The 4 Food Groups for Better Meals Game" can be obtained from the Food and Nutrition Service, U.S. Department of Agriculture, Washington, D.C. 20250.
Coronary heart disease is one of the biggest health problems in the U.S. today.

Find: CORONARY, HEART, DISEASE

What we eat (diet), how much exercise we get, if we smoke cigarettes, and if others in our family have had heart disease (heredity) can affect whether each of us will have coronary heart disease.

Find: DIET

A diet low in saturated fat (fat from animals), low in sugar, and low in cholesterol will help you to not get coronary heart disease.

Find: FAT SUGAR CHOLESTEROL

Below are some foods that have little saturated fat, sugar, or cholesterol.

Find: LEAN MEAT, FISH, SKIN MILK, NUTS MARGARINE (made from liquid oil)

Does anyone in your family have coronary heart disease?
Circle one: YES NO DON'T KNOW

Is there anything YOU can do to help prevent your getting coronary heart disease?
Circle one: YES NO DON'T KNOW
USING CHALLENGE

How to Get the Most Learning from Challenge

What Is Challenge? - It is an educational game using a gameboard, questions and answers.

Aim - Players learn facts about a subject in a fun and involved way.

Challenge Supplements - A supplement is a set of questions and answers related to one topic. Use all or just some of the questions for one game.

Challenge Gameboard - Directions for play are on the gameboard. The gameboard can be used with any subject supplement question and answers.

Who Can Play Challenge? Challenge can be played by people of all ages from 9 years old through the golden years. Younger children can play as members of a team.

It can be played by families or other groups. It may also be played by only one person. It may be used as a self-study tool or used under the guidance of a leader who would stimulate discussion and application of information.

How Many People Per Game? - One Challenge gameboard is best shared by no more than 4 to 6 people. Thus if 20 people wanted to play at the same time, 4 or 5 Challenge games would be needed.

Small Group Involvement - The team method of playing Challenge has advantages over the singles method since no one is put on the spot if an answer is wrong and discussion tends to be stimulated.

Using Challenge with a Teacher or Leader - Challenge may be played before, during or after the study of a related subject. Using Challenge first provides a fun kind of pretest, using it during a unit of content provides stimulation; using it near the end provides reinforcement and evaluation.

Challenge supplies facts and understanding. The leader must provide learning experiences to help players use the information. For example the leader might ask players to put aside questions to be discussed at the end of the game. A discussion might start with these questions. The players should be encouraged to explore ways of applying the content to themselves.

From the University of Nebraska Extension Service, 1972.
WEIGHT CHALLENGE GAME

How to Play

2 or 3 players

Shuffle and stack questions face down.

Place one marker (like beans, buttons or corn) per player on scoreboard.

Choose to see who goes first.

Player not up draws a question from the top of the deck and reads the question to the player who goes first. An answer is given by the player. If it is correct, according to the printed answer, the player advances his marker on the scoreboard the number of spaces stated on the question. When an answer is given that is good (although different from the printed one) partial or total credit may be given if all the players agree to it.

Play goes to the next player clockwise with someone else reading the question to him.

Follow directions on the scoreboard. When a player reaches the “better life” area on the scoreboard he wins that round. All start again in the center box for a new round using any question left over and/or reshuffling all the questions.

Person winning the most rounds wins the game.

Teams

4 to 6 players in teams of 2 or 3. Use the same rules except direct the question to the team. The team members talk about the answer and give one answer for the team.

Solitaire

1 person plays. Cover the question with a blank piece of paper. Move paper down to reveal the question but not the answer. Write the answer. Check it with the printed answer. Move a marker on the scoreboard if correct. Play again another day and compare scores.

Variation

Players might make up their own rules.
APPENDIX C:

PERSONAL DATA SHEET
1. What is your age?

2. Indicate highest level of education completed:
   
   _____ 9th grade
   _____ 10th grade
   _____ 11th grade
   _____ 12th grade
   _____ 1st year college
   _____ 2nd year college
   _____ 3rd year college
   _____ 4th year college
   _____ other (specify)

3. How long have you been working as a nutrition aide with Cooperative Extension Service?
   
   _____ Years    _____ Months

4. Have you participated in educational activities other than on your job as nutrition aide?
   
   _____ Yes    _____ No

5. If No. 4 is yes, please indicate the type of educational activity and length of time you participated in such activity.
KNOWLEDGE PRETEST

This test consists of 30 questions. There is ONE best answer to each question. Check (V) what you think the one best answer is. Do not leave any questions blank.

1. Losing one pound of fat means reducing and/or expending
   - a. 2800 kcalories
   - b. 3000 kcalories
   - c. 3500 kcalories
   - d. 3800 kcalories

2. It is especially wise to keep a close check on body weight after age
   - a. 18
   - b. 25
   - c. 30
   - d. 40

3. For each pound of fat above your desirable weight, the heart pumps blood through the blood vessels similar to the distance of
   - a. 1/3 mile
   - b. 1/2 mile
   - c. 2/3 mile
   - d. 1 mile

4. Part of the overweight problem is because of
   - a. increasing age
   - b. inadequate physical activity
   - c. energy requirements that are different from person to person
   - d. company meals which are changing

5. One can stay at an ideal weight through all ages of the life cycle with determination. The key is:
   - a. to offer low calorie foods and beverages as gestures of hospitality
   - b. a permanent change in eating habits plus a daily practice of physical activity
   - c. to plan your new diet carefully
   - d. to become more aware that you are overeating

6. The kcal value of a food depends on the
   - a. serving size
   - b. food group it belongs to
   - c. sweetness
   - d. weight

7. The amount of dark green, deep yellow vegetables in a woman's daily plan should be:
   - a. like that in a man's daily plan
   - b. three times as much as that in the man's daily plan
   - c. twice that in the man's diet
   - d. less than that in the man's diet
8. The energy needs of women are less than the energy needs of men because of
   _____ a. their difference in sex
   _____ b. their difference in eating habits
   _____ c. their difference in body size
   _____ d. their difference in height

9. Three energy foods are
   _____ a. minerals, vitamins, and water
   _____ b. fat, protein, and vitamin C
   _____ c. carbohydrates, fat, and protein
   _____ d. iron, calcium, and vitamin B-12

10. Sugar robs this vitamin from other foods for its digestion
    _____ a. riboflavin
    _____ b. vitamin C
    _____ c. thiamin
    _____ d. vitamin A

11. When lowering caloric intake
    _____ a. eat no more than 4 servings of foods from the Bread-Cereal Group daily
    _____ b. use nondairy creamers, toppings, or whipping cream
    _____ c. hurry while you are eating so you don't eat too much
    _____ d. eat inadequate amounts of any of the four food groups

12. In cutting calories during food preparation,
    _____ a. use a small amount of fat when pan-frying vegetables
    _____ b. use flavored gelatin for making salads and desserts
    _____ c. try herbs, spices, or lemon juice rather than season food with fat
    _____ d. use evaporated milk instead of whole milk

13. It is time to lower your kcal intake and to increase your physical exercise if when using the pinch test, the pinched portion is
    _____ a. 1/2 inch
    _____ b. 1/3 inch (the pinch test is pinching the flesh just above the waist)
    _____ c. 1 inch
    _____ d. more than an inch

14. A good way to start a meal when on a weight reduction program is with
    _____ a. dry toast
    _____ b. 2% milk
    _____ c. raw vegetables in bite-size pieces
    _____ d. soup

15. Should you want more food while on a weight reduction program, choose from the
    _____ a. milk group
    _____ b. meat group
    _____ c. fruit-vegetable group
    _____ d. bread-cereal group
16. In infants, energy that is left after it is used to meet body processes such as growth, is stored in
   ______ a. muscle cells
   ______ b. red blood cells
   ______ c. nerve cells
   ______ d. fat cells

17. A chubby infant or child often has
   ______ a. better food habits
   ______ b. a clean plate after each meal
   ______ c. more stomach troubles and infections
   ______ d. better resistance to infections

18. It appears to benefit the child if the mother's total weight gain during pregnancy is up to
   ______ a. 15 pounds
   ______ b. 20 pounds
   ______ c. 30 pounds
   ______ d. 35 pounds

19. Overeating by the infant or young child often results because
   ______ a. the child likes a variety of foods
   ______ b. the child imitates parents in food attitudes
   ______ c. it is an easy way to quiet the child
   ______ d. the child is often unhappy

20. The most cherished gift parents can give their children is
   ______ a. good eating habits
   ______ b. good table manners
   ______ c. using food as a reward for good deeds
   ______ d. constant introduction of new foods

21. Two types of excessive fat in the blood system causing alarm are
   ______ a. vegetable fats and animal fats
   ______ b. corn oil and lard
   ______ c. triglycerides and cholesterol
   ______ d. coconut oil and saturated fats

22. Physical activity aids in
   ______ a. lowering weight
   ______ b. improving muscle tone of the heart and blood vessels
   ______ c. lowering cholesterol levels in the blood
   ______ d. all of the above

23. The highest risks of coronary heart disease are found in
   ______ a. young adults
   ______ b. middle aged women
   ______ c. pregnant women
   ______ d. overweight persons who are not physically active
24. The recommended amount of kcalories from fat in the American diet should be a range of from
   ______ a. 10 to 15 percent
   ______ b. 25 to 30 percent
   ______ c. 40 to 50 percent
   ______ d. 65 to 70 percent

25. Overweight added to atherosclerosis (or hardening of the arteries)
   ______ a. increases bone fragility
   ______ b. increases pressure on the heart to pump blood through the blood vessels
   ______ c. causes fatty plaques (or fatty deposits)
   ______ d. causes blood clots

26. Many crash and fad diets result in rapid weight loss at the start. Nearly all of this loss is
   ______ a. carbohydrates
   ______ b. water
   ______ c. protein
   ______ d. fat

27. The most concentrated source of kcal in the diet is
   ______ a. protein
   ______ b. minerals
   ______ c. fat
   ______ d. carbohydrates

28. The use of drugs is among the least desirable ways to cope with obesity. One of the most commonly misused drugs in reducing weight is
   ______ a. thyroid hormone
   ______ b. "Ayds" candy
   ______ c. multi vitamins
   ______ d. ascorbic acid tablets

29. The intake of hidden fat in meats can defeat the goal of weight reduction when eaten in amounts greater than recommended. The recommended amount of meat to be eaten daily is
   ______ a. one serving of 2 to 3 ounces lean meat
   ______ b. two servings of 2 to 3 ounces lean meat
   ______ c. three servings of 2 to 3 ounces lean meat
   ______ d. four servings of 2 to 3 ounces lean meat

30. Protein beyond body needs is wasted. Some of it is
   ______ a. converted to fat as if it were carbohydrate
   ______ b. converted to cholesterol
   ______ c. converted to gall stones
   ______ d. converted to sugar in the body
KNOWLEDGE POSTTEST

This test consists of 30 questions. There is ONE best answer to each question. Check ( ) what you think the one best answer is. Do not leave any questions blank.

1. A good way to start a meal when on a weight reduction program is with
   a. soup
   b. raw vegetables in bite-size pieces
   c. 2% milk
   d. dry toast

2. Two types of excessive fat in the blood system causing alarm are
   a. coconut oil and saturated fats
   b. triglycerides and cholesterol
   c. corn oil and lard
   d. vegetable fats and animal fats

3. It is time to lower your kcal intake and to increase your physical exercise if when using the pinch test, the pinched portion is
   a. 1/2 inch
   b. 1/3 inch (the pinch test is pinching the flesh just above the waist)
   c. 1 inch
   d. more than an inch

4. The most cherished gift parents can give their children is
   a. constant introduction of new foods
   b. using food as a reward for good deeds
   c. good table manners
   d. good eating habits

5. Part of the overweight problem is because of
   a. company meals which are changing
   b. energy requirements that are different from person to person
   c. inadequate physical activity
   d. increasing age

6. In cutting calories during food preparation,
   a. use evaporated milk instead of whole milk
   b. try herbs, spices, or lemon juice rather than season food with fat
   c. use flavored gelatin for making salads and desserts
   d. use a small amount of fat when pan-frying vegetables

7. A chubby infant or child often has
   a. better resistance to infections
   b. more stomach troubles and infections
   c. a clean plate after each meal
   d. better food habits
8. When lowering caloric intake
   a. eat inadequate amounts of any of the four food groups
   b. hurry while you are eating so you don't eat too much
   c. use nondairy creamers, toppings, or whipping cream
   d. eat no more than 4 servings of foods from the Bread-Cereal Group daily

9. The recommended amount of kcalories from fat in the American diet should be a range of from
   a. 10 to 15 percent
   b. 25 to 30 percent
   c. 40 to 50 percent
   d. 65 to 70 percent

10. For each pound of fat above your desirable weight, the heart pumps blood through the blood vessels similar to the distance of
    a. 1/3 mile
    b. 1/2 mile
    c. 2/3 mile
    d. 1 mile

11. Physical activity aids in
    a. all of the below
    b. lowering cholesterol levels in the blood
    c. improving muscle tone of the heart and blood vessels
    d. lowering weight

12. It is especially wise to keep a close check on body weight after age
    a. 18
    b. 25
    c. 30
    d. 40

13. Overeating by the infant or young child often results because
    a. the child is often unhappy
    b. it is an easy way to quiet the child
    c. the child imitates parents in food attitudes
    d. the child likes a variety of foods

14. Losing one pound of fat means reducing and/or expending
    a. 2800 kcalories
    b. 3000 kcalories
    c. 3500 kcalories
    d. 3800 kcalories

15. It appears to benefit the child if the mother's total weight gain during pregnancy is up to
    a. 15 pounds
    b. 20 pounds
    c. 30 pounds
    d. 35 pounds
16. In infants, energy that is left after it is used to meet body processes such as growth, is stored in
   ______ a. fat cells
   ______ b. nerve cells
   ______ c. red blood cells
   ______ d. muscle cells

17. The energy needs of women are less than the energy needs of men because of
   ______ a. their difference in height
   ______ b. their difference in body size
   ______ c. their difference in eating habits
   ______ d. their difference in sex

18. The highest risks of coronary heart disease are found in
   ______ a. overweight persons who are not physically active
   ______ b. pregnant women
   ______ c. middle aged women
   ______ d. young adults

19. Should you want more food while on a weight reduction program, choose from the
   ______ a. bread-cereal group
   ______ b. fruit-vegetable group
   ______ c. meat group
   ______ d. milk group

20. Sugar robs this vitamin from other foods for its digestion
   ______ a. vitamin A
   ______ b. thiamin
   ______ c. vitamin C
   ______ d. riboflavin

21. Three energy foods are
   ______ a. iron, calcium, and vitamin B-12
   ______ b. carbohydrates, fat, and protein
   ______ c. fat, protein, and vitamin C
   ______ d. minerals, vitamins, and water

22. The amount of dark green, deep yellow vegetables in a woman's daily plan
    should be
   ______ a. less than that in the man's diet
   ______ b. twice that in the man's diet
   ______ c. three times as much as that in the man's daily plan
   ______ d. like that in a man's daily plan

23. The intake of hidden fat in meats can defeat the goal of weight reduction when
    eaten in amounts greater than recommended. The recommended amount of meat to
    be eaten daily is
   ______ a. one serving of 2 to 3 ounces lean meat
   ______ b. two servings of 2 to 3 ounces lean meat
   ______ c. three servings of 2 to 3 ounces lean meat
   ______ d. four servings of 2 to 3 ounces lean meat
24. The use of drugs is among the least desirable ways to cope with obesity. One of the most commonly misused drugs in reducing weight is
   a. ascorbic acid tablets
   b. multi vitamins
   c. "Ayds" candy
   d. thyroid hormone

25. Protein beyond body needs is wasted. Some of it is
   a. converted to sugar in the body
   b. converted to gall stones
   c. converted to cholesterol
   d. converted to fat as if it were carbohydrate

26. One can stay at an ideal weight through all ages of the life cycle with determination. The key is:
   a. to become more aware that you are overeating
   b. to plan your new diet carefully
   c. a permanent change in eating habits plus a daily practice of physical activity
   d. to offer low calorie foods and beverages as gestures of hospitality

27. Many crash and fad diets result in rapid weight loss at the start. Nearly all of this loss is
   a. fat
   b. protein
   c. water
   d. carbohydrates

28. Overweight added to atherosclerosis (or hardening of the arteries)
   a. causes blood clots
   b. causes fatty plaques (or fatty deposits)
   c. increases pressure on the heart to pump blood through the blood vessels
   d. increases bone fragility

29. The most concentrated source of kcal in the diet is
   a. carbohydrates
   b. fat
   c. minerals
   d. protein

30. The kcal value of a food depends on the
   a. weight
   b. sweetness
   c. food group it belongs to
   d. serving size
APPENDIX E:

LETTERS TO MT. GILEAD AREA
COUNTY HOME ECONOMISTS AND NUTRITION AIDES
February 18, 1977

To: Margi Griffiths
    Eleanor Laneve
    Jean McClester
    Dian Morse

Re: Testing Instrument for use with EFNEP Paraprofessionals

Dear Co-Workers:

The enclosed instrument was developed to measure cognitive gain before and after a series of training lessons on weight modification for a selected group of nutrition aides. This group of aides will be participating in a research project on adult learning.

Before this test will be used in the research project, I would like to obtain reactions from the nutrition aides in your respective counties. Please have each aide take the test then review and inspect each test item with them using the following criteria:

1- Is the wording and/or phrasing of each question clear? Vague?
2- Is the question related to weight control concepts? Not relevant?
3- Is the question too easy to understand? Too difficult?
4- Other comments you wish to make.

I am enclosing copies for each aide plus one extra for comments. Please return all the copies with your reactions and comments to me. The aides do not have to sign their names when taking the test.

I do appreciate your taking the time and the aide's time in reviewing the test instrument. Thank you so much.

Sincerely,

Alma M. Saddam
Extension Specialist
Nutrition

Enclosures

AMS/sr
APPENDIX F:

LIKERT-TYPE ATTITUDE SCALE
We are interested in understanding how people may see nutrition as promoting a better quality of life. The science of nutrition is the development of knowledge. The practice of nutrition is applying that knowledge. In a survey of people like yourself, the following statements were the ones most often given.

To further explore this subject, it would be appreciated if you would respond to the following statements. Please, read each statement and then check the position that best describes your viewpoint toward the practice of nutrition.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>SA</th>
<th>A</th>
<th>UN</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Children should eat what is on the plate, mother knows best.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I usually will not taste a food if its appearance is similar to something I dislike.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I would be willing to try an unfamiliar food at least once.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. At home, I will not eat rather than be served something I don't like.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATEMENT</td>
<td>SA</td>
<td>A</td>
<td>UN</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>5. I believe that people should be encouraged to prepare and eat foods that are nutritious, instead of foods which are just merely new.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Knowing something is &quot;good for me&quot; has little or no influence on what I choose to eat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Unfamiliar foods often interest me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I think traditional ways of preparing food are the best ways.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I could learn to eat fruit for dessert rather than a pastry.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. In my opinion, the best advice when eating away from home is to avoid the unknown.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Exploring several methods of food preparation, using unusual combinations, is desirable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I believe that the person who gets the most satisfaction out of eating is the one who sticks to the foods that he knows.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. If my diet were poor, I would probably take vitamin pills rather than vary the foods that I choose.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Learning the basic ideas in nutrition will probably alter my personal eating habits very little.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Food selection is a personal decision; people shouldn't try to persuade me to change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. For better health, I would be willing to try a food I hadn't eaten before or several foods over a period of time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATEMENT</td>
<td>SA</td>
<td>A</td>
<td>UN</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>17. Teaching calorie control and food selection to a fat person is a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>waste of time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Vegetables are good eating because they can be prepared in so many</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ways.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I feel uneasy when I taste new and unusual foods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I think that food habits should be flexible enough to vary with a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>new situation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. The Basic Four Food Groups are the only usable tools for planning an</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequate diet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. It is fun to try out new foods and old foods fixed in a new way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. If I am satisfied with foods chosen, I see no reason for me to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. I like for my family to stick to the old favorite meals, rather than</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mess them up with new and different kinds of foods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I believe that preparing a new dish every week increases my ability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to work and it brings out my imagination.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. I fell that variety in a diet is the spice of life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I feel that I am better off to continue my usual dietary practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>since many of the new fangled ideas are not suited to my situation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. By planning the overall food intake for a day or a week, snacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>may increase the adequacy of the diet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATEMENT</td>
<td>SA</td>
<td>A</td>
<td>UN</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>29. I would like to see supermarkets or grocery stores stock foods and give out recipes from other parts of the United States.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. When I read about new foods and different ways of preparing food, I doubt they are as good as the ones I have.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. In my opinion, people should be encouraged to try out foods that are nutritious.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. In actual practice, my nutrition knowledge has little influence on what I select to eat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. One important purpose of nutrition education is to help people make decisions that promote health.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Restricting my meal patterns to familiar foods ensures that I enjoy what I eat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. I would fix more nutritious meals if I knew what to prepare.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. I enjoy my family's cooking the most, but I would be happy to eat someone else's cooking.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. I try new recipes frequently.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Trying new and different foods can enhance the old favorites.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. I think people should try a variety of foods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Children should be taught to explore and eat a variety of foods; however, adults should be left alone.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX G:

DEMOGRAPHIC VARIABLES
PRETEST AND POSTTEST SCORES ON THE KNOWLEDGE TEST
AND ATTITUDE SCALE
### ANOVA WITH COVARIATES

**FILE ADULTLRN (CREATION DATE = 06/09/77)**

<table>
<thead>
<tr>
<th>CASE-N</th>
<th>AGE</th>
<th>EDUC</th>
<th>EMP</th>
<th>KPRE</th>
<th>KPOST</th>
<th>APRE</th>
<th>APOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45</td>
<td>12</td>
<td>5</td>
<td>19</td>
<td>13</td>
<td>162</td>
<td>149</td>
</tr>
<tr>
<td>2</td>
<td>58</td>
<td>12</td>
<td>8</td>
<td>19</td>
<td>14</td>
<td>147</td>
<td>154</td>
</tr>
<tr>
<td>3</td>
<td>59</td>
<td>12</td>
<td>8</td>
<td>19</td>
<td>17</td>
<td>151</td>
<td>159</td>
</tr>
<tr>
<td>4</td>
<td>59</td>
<td>12</td>
<td>2</td>
<td>23</td>
<td>21</td>
<td>170</td>
<td>179</td>
</tr>
<tr>
<td>5</td>
<td>53</td>
<td>12</td>
<td>6</td>
<td>20</td>
<td>163</td>
<td>172</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>53</td>
<td>12</td>
<td>3</td>
<td>20</td>
<td>18</td>
<td>168</td>
<td>167</td>
</tr>
<tr>
<td>7</td>
<td>47</td>
<td>12</td>
<td>4</td>
<td>16</td>
<td>14</td>
<td>123</td>
<td>128</td>
</tr>
<tr>
<td>8</td>
<td>41</td>
<td>9</td>
<td>6</td>
<td>19</td>
<td>15</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>9</td>
<td>41</td>
<td>14</td>
<td>8</td>
<td>18</td>
<td>20</td>
<td>168</td>
<td>172</td>
</tr>
<tr>
<td>10</td>
<td>37</td>
<td>13</td>
<td>3</td>
<td>19</td>
<td>20</td>
<td>149</td>
<td>141</td>
</tr>
<tr>
<td>11</td>
<td>42</td>
<td>11</td>
<td>5</td>
<td>19</td>
<td>19</td>
<td>169</td>
<td>167</td>
</tr>
<tr>
<td>12</td>
<td>37</td>
<td>12</td>
<td>6</td>
<td>18</td>
<td>15</td>
<td>142</td>
<td>131</td>
</tr>
</tbody>
</table>

**CONTROL**
### ANOVA WITH COVARIATES

**FILE** ADULTLRN (CREATION DATE: 06/09/77)

<table>
<thead>
<tr>
<th>CASE-N</th>
<th>AGE</th>
<th>EDUC</th>
<th>EMP</th>
<th>KPRE</th>
<th>KPOST</th>
<th>APRE</th>
<th>APOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41.</td>
<td>12.</td>
<td>1.</td>
<td>22.</td>
<td>27.</td>
<td>166.</td>
<td>170.</td>
</tr>
<tr>
<td>3</td>
<td>43.</td>
<td>11.</td>
<td>8.</td>
<td>19.</td>
<td>20.</td>
<td>148.</td>
<td>160.</td>
</tr>
<tr>
<td>4</td>
<td>48.</td>
<td>13.</td>
<td>8.</td>
<td>17.</td>
<td>22.</td>
<td>121.</td>
<td>114.</td>
</tr>
<tr>
<td>5</td>
<td>49.</td>
<td>12.</td>
<td>8.</td>
<td>15.</td>
<td>18.</td>
<td>139.</td>
<td>156.</td>
</tr>
<tr>
<td>6</td>
<td>39.</td>
<td>11.</td>
<td>8.</td>
<td>20.</td>
<td>17.</td>
<td>146.</td>
<td>148.</td>
</tr>
<tr>
<td>7</td>
<td>57.</td>
<td>9999.</td>
<td>8.</td>
<td>15.</td>
<td>14.</td>
<td>156.</td>
<td>150.</td>
</tr>
<tr>
<td>8</td>
<td>48.</td>
<td>11.</td>
<td>7.</td>
<td>15.</td>
<td>14.</td>
<td>156.</td>
<td>158.</td>
</tr>
<tr>
<td>9</td>
<td>33.</td>
<td>13.</td>
<td>6.</td>
<td>13.</td>
<td>18.</td>
<td>162.</td>
<td>156.</td>
</tr>
<tr>
<td>11</td>
<td>45.</td>
<td>10.</td>
<td>8.</td>
<td>10.</td>
<td>14.</td>
<td>132.</td>
<td>140.</td>
</tr>
<tr>
<td>12</td>
<td>21.</td>
<td>12.</td>
<td>2.</td>
<td>21.</td>
<td>23.</td>
<td>146.</td>
<td>144.</td>
</tr>
<tr>
<td>13</td>
<td>23.</td>
<td>16.</td>
<td>1.</td>
<td>23.</td>
<td>17.</td>
<td>146.</td>
<td>145.</td>
</tr>
<tr>
<td>14</td>
<td>23.</td>
<td>16.</td>
<td>1.</td>
<td>23.</td>
<td>27.</td>
<td>175.</td>
<td>177.</td>
</tr>
<tr>
<td>17</td>
<td>60.</td>
<td>9.</td>
<td>8.</td>
<td>14.</td>
<td>16.</td>
<td>135.</td>
<td>137.</td>
</tr>
</tbody>
</table>

**CORRESPONDENCE INSTRUCTION**
<table>
<thead>
<tr>
<th>CASE-N</th>
<th>AGE</th>
<th>EDUC</th>
<th>EMP</th>
<th>KPRE</th>
<th>KPOST</th>
<th>APRE</th>
<th>APOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32</td>
<td>11</td>
<td>3</td>
<td>13</td>
<td>20</td>
<td>140</td>
<td>138</td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>13</td>
<td>142</td>
<td>149</td>
</tr>
<tr>
<td>3</td>
<td>44</td>
<td>12</td>
<td>8</td>
<td>19</td>
<td>20</td>
<td>152</td>
<td>145</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>10</td>
<td>8</td>
<td>19</td>
<td>16</td>
<td>162</td>
<td>166</td>
</tr>
<tr>
<td>5</td>
<td>59</td>
<td>10</td>
<td>8</td>
<td>20</td>
<td>22</td>
<td>163</td>
<td>162</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>14</td>
<td>6</td>
<td>23</td>
<td>18</td>
<td>149</td>
<td>156</td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td>18</td>
<td>134</td>
<td>136</td>
</tr>
<tr>
<td>8</td>
<td>48</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td>19</td>
<td>157</td>
<td>163</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>13</td>
<td>4</td>
<td>23</td>
<td>9999</td>
<td>9999</td>
<td>9999</td>
</tr>
<tr>
<td>10</td>
<td>47</td>
<td>12</td>
<td>8</td>
<td>9999</td>
<td>18</td>
<td>168</td>
<td>173</td>
</tr>
<tr>
<td>11</td>
<td>50</td>
<td>12</td>
<td>8</td>
<td>20</td>
<td>165</td>
<td>168</td>
<td>168</td>
</tr>
<tr>
<td>12</td>
<td>39</td>
<td>12</td>
<td>8</td>
<td>19</td>
<td>171</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td>13</td>
<td>44</td>
<td>15</td>
<td>8</td>
<td>18</td>
<td>152</td>
<td>149</td>
<td>149</td>
</tr>
<tr>
<td>14</td>
<td>40</td>
<td>12</td>
<td>6</td>
<td>20</td>
<td>153</td>
<td>159</td>
<td>159</td>
</tr>
<tr>
<td>15</td>
<td>59</td>
<td>9</td>
<td>8</td>
<td>14</td>
<td>148</td>
<td>129</td>
<td>129</td>
</tr>
</tbody>
</table>

DISCUSSION-LABORATORY
## ANOVA WITH COVARIATES

**FILE ADULTLRN (CREATION DATE = 06/09/77)**

<table>
<thead>
<tr>
<th>CASE-N</th>
<th>AGE</th>
<th>EDUC</th>
<th>EMP</th>
<th>KPRE</th>
<th>KPOST</th>
<th>APRE</th>
<th>APOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34.</td>
<td>13.</td>
<td>1</td>
<td>17.</td>
<td>21.</td>
<td>156.</td>
<td>155.</td>
</tr>
<tr>
<td>2</td>
<td>49.</td>
<td>12.</td>
<td>8</td>
<td>19.</td>
<td>18.</td>
<td>151.</td>
<td>147.</td>
</tr>
<tr>
<td>3</td>
<td>45.</td>
<td>14.</td>
<td>3</td>
<td>17.</td>
<td>20.</td>
<td>158.</td>
<td>159.</td>
</tr>
<tr>
<td>4</td>
<td>47.</td>
<td>12.</td>
<td>8</td>
<td>20.</td>
<td>22.</td>
<td>163.</td>
<td>172.</td>
</tr>
<tr>
<td>6</td>
<td>58.</td>
<td>12.</td>
<td>8</td>
<td>18.</td>
<td>15.</td>
<td>138.</td>
<td>159.</td>
</tr>
<tr>
<td>7</td>
<td>41.</td>
<td>11.</td>
<td>2</td>
<td>16.</td>
<td>21.</td>
<td>99.</td>
<td>102.</td>
</tr>
<tr>
<td>8</td>
<td>45.</td>
<td>13.</td>
<td>2</td>
<td>14.</td>
<td>17.</td>
<td>156.</td>
<td>147.</td>
</tr>
<tr>
<td>9</td>
<td>42.</td>
<td>11.</td>
<td>8</td>
<td>17.</td>
<td>15.</td>
<td>94.</td>
<td>104.</td>
</tr>
<tr>
<td>10</td>
<td>49.</td>
<td>12.</td>
<td>8</td>
<td>19.</td>
<td>17.</td>
<td>183.</td>
<td>182.</td>
</tr>
<tr>
<td>11</td>
<td>40.</td>
<td>12.</td>
<td>7</td>
<td>14.</td>
<td>18.</td>
<td>158.</td>
<td>165.</td>
</tr>
<tr>
<td>12</td>
<td>50.</td>
<td>11.</td>
<td>7</td>
<td>14.</td>
<td>20.</td>
<td>140.</td>
<td>147.</td>
</tr>
<tr>
<td>13</td>
<td>52.</td>
<td>12.</td>
<td>7</td>
<td>19.</td>
<td>27.</td>
<td>131.</td>
<td>146.</td>
</tr>
<tr>
<td>14</td>
<td>55.</td>
<td>12.</td>
<td>7</td>
<td>14.</td>
<td>25.</td>
<td>149.</td>
<td>138.</td>
</tr>
<tr>
<td>15</td>
<td>27.</td>
<td>15.</td>
<td>2</td>
<td>23.</td>
<td>21.</td>
<td>153.</td>
<td>148.</td>
</tr>
<tr>
<td>16</td>
<td>68.</td>
<td>12.</td>
<td>7</td>
<td>25.</td>
<td>27.</td>
<td>157.</td>
<td>151.</td>
</tr>
</tbody>
</table>

---

**DISCUSSION-GAMING**
BIBLIOGRAPHY


Buck, R. J. Watch Your Weight. (Correspondence course 182). College of Agriculture, The Pennsylvania State University, 1974.


