

DEVELOPMENT OF A GRAPHIC LABORATORY
PRETEST FOR A BEGINNING COLLEGE
FOOD PREPARATION COURSE

By

BETTY JEAN STOCKTON

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Thesis Approved:

Walter F. Barber

Thesis Adviser

Elaine Jorgensen

Harry K. Probst

W. W. Murham

Dean of the Graduate College

830920

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CHAPTER I

INTRODUCTION

With growing enrollment in all programs in institutions of higher education it has become increasingly important to develop sound methods for assessing the levels of academic preparation of students entering these institutions. In the field of home economics for example, tests have been developed to measure knowledge the students have acquired of the various facets of this field prior to entering the first year of college. Data obtained from reliable and valid testing instruments have been useful in placement, counseling and in the development of appropriate curricular objectives in home economics courses.

The reasons stated more specifically imply that appropriate measuring devices continue to be useful in that (1) students with suitable backgrounds for advanced courses can be placed in such courses from the data obtained in tests, and (2) students can be placed in groups representing different levels of acceleration for obtaining similar instructional goals. All of the students can be put in sections in which they can be challenged and motivated, but in

which subject matter is not too difficult for them to handle.

The development of a test for assessing levels of background and preparation in any discipline involves considerable expenditure of time and money on the part of the individuals preparing the instrument. The test should be reliable and have an acceptable level of validity when evaluated against an appropriate criterion. It is advantageous to have a test that can be administered in one hour or less. It is desirable that the instrument consist of questions which can be responded to on an answer sheet which can be scored by test scoring equipment.

Steelman (18) did some preliminary work on a laboratory test in 1961 for students enrolled in a beginning food preparation course at Oklahoma State University. This test was found to be too time consuming and expensive to set up and administer.

Hypotheses of the Study

The investigation reported in this study represents an effort to improve Steelman's (18) laboratory pretest. The concerns which were examined in developing the test instrument were as follows:

1. Pictures can be used to depict laboratory situations in the test questions.
2. Multiple-choice questions with four distractors are

desirable objective questions for the Pretest.

3. The test can be shortened to 50 minutes in length.
4. A test that is easy to set up and administer can be developed.
5. The laboratory pretest can be administered to undergraduates who have not completed a course in beginning food preparation in college.
6. Item analysis can be used to evaluate the test and assure it's validity.

Objectives of the Study

The objectives of this research are to develop a pretest that will meet the following requisites of rigorous test construction: (1) Contain objective items which will meet acceptable standards of difficulty; (2) contain objective items which will meet acceptable levels of discrimination; (3) manifest a satisfactory level of test reliability; (4) have an acceptable validity in terms of course content; (5) make appropriate cutting scores available on the basis of the distributions of test data; and (6) utilize standardized procedures for the administration and scoring of the instrument.

Design of the Study

The steps undertaken in developing the test are presented at this point in outline form. The detailed procedures

are delineated in the following sections of the report. The general steps were as follows:

1. Objectives of the test were made to assure that the goals of the class were met.
2. A table of specifications was developed for the purpose of determining the proportions of items to be prepared to insure adequate coverage of content.
3. Concepts were used to make the objectives more concrete and easier to work with.
4. Generalizations were formed so that test questions could be made from them.
5. Objective test items depicted in graphic form, were developed to assess responses to overhead transparencies of laboratory situations in a beginning food preparation course.
6. A standardized procedure for the administration of the test was prepared.
7. The test was given to 70 students who had not taken previous college courses in food preparation.
8. The test items were analyzed for levels of difficulty and discrimination by the technique described by Davis (8).
9. The reliability of the instrument was determined by means of the split-half technique, with the overall reliability obtained by use of the Spearman-Brown

prophecy formula.

Following the development and analysis described in this report the instrument should be administered by the investigator to a comparable group of subjects for the purpose of further refining it. It is desirable to have not less than 500 subjects for this purpose.

Clarification of Terms

In this study the definition of terms accepted by the author are as follows:

Objective: According to Mager (15), objectives are goals that a teacher plans to reach upon completion of his class.

Concepts: According to Tinsley and Sitton (20, p. 86), "A concept is an idea which a person forms in his mind in order to understand and cope with something in his experience."

Generalizations: According to Eppright, Pattison, and Barbour (9, p. 102), "Generalizations are statements supported by fact or belief that apply in situations beyond those in which the generalization is learned."

Validity: According to Ahamann and Glock (1, p. 285) validity is "...the degree to which a measuring instrument actually serves the purpose for which it is intended."

Reliability: According to Ahamann and Block (1, p. 311), "Reliability means consistency of results."

CHAPTER II

REVIEW OF LITERATURE

Introduction

The world is changing at an every increasing rate and the knowledge of the sciences has doubled in less than twenty years. This caused Tyler (22, p. 527) to say "...the time lag between major changes and our adaptation to these changes has become a much more serious threat to our development and even our survival than ever before in history."

No where is the need to convert scientific knowledge to practical knowledge greater than in the area of food and nutrition. According to Eppright, Pattison, and Barbour (9, p. 3): "...education is the cornerstone to good nutrition." This means that much work is needed in the area of food and nutrition education to improve the health of the world.

One place where these goals can be met effectively is in the colleges and universities. The reason being that people from all over the world come to these institutions to learn ways of helping their fellow men. It is a great waste of time, therefore, to put students in classes that only re-

peat knowledge they have already acquired. One answer to this problem is the giving of pretests.

Pretests

Pretests have been developed in many areas of home economics (3, 5, 12, 24) but those of greatest concern here are the ones directly related to courses in food and nutrition from Oklahoma State University.

In 1961 an attempt was made by Steelman (18) to make two pretests for a beginning college course in food preparation--one test for the theory and the other for the laboratory part of the class. She established the need for objectives and generalizations in pretests. She stated (18, p. 3) that: "Objectives are the most critical criteria for guiding all other activities of the curriculum maker." Ahamann and Glock said (1, p. 8): "From the point of view of pupil evaluation, objectives stated in terms of outwardly observable behavior are most suitable." This means that a skilled observer should be able to define the objectives of the pretest by observing the success of a student in an advanced class for which subject matter of the pretest is a prerequisite.

In defining generalizations, Eppright, Pattison and Barbour (9, p. 102) said: "Generalizations are statements supported by facts or beliefs that apply in situations be-

yond those in which the generalization is learned." They also stated that (9, p. 102): "There are no generally acceptable criteria for differentiating between generalizations, principles, laws, rules, or facts of broad application." In pretests, it is from generalizations that the test questions are made.

Steelman and Barbour (19) developed their generalizations by using recent textbooks and bulletins. Members of the faculty at Oklahoma State University, who taught the course in beginning food preparation, evaluated the generalizations for reliability, level, and importance.

In constructing her laboratory pretest, Steelman (18) decided that multiple-choice questions with four distractors were best for her purpose. An objective test has many advantages (16, p. 16). The objective test:

1. Requires the student to select correct answers from given options, or to supply an answer limited to one word or phrase.
2. Can also tap high levels of reasoning such as required in inference, organization of ideas, comparison and contrast.
3. Measures knowledge of facts efficiently.
4. Covers a broad field of knowledge in one test. Since objective questions may be answered quickly, one test may contain many questions. A broad coverage helps provide reliable measurement.
5. Encourages pupils to build up a broad background of knowledge and abilities.
6. Requires writing many questions for a test. Wording

must avoid ambiguities and 'giveaways'. Distractors should embody most likely misconceptions.

7. Can be scored quickly.
8. Answer generally scored only right or wrong, but scoring is very accurate and consistent.

Steelman and Barbour (19, p. 423) also made a laboratory pretest for a beginning food preparation class. Their goals were "Objectivity, validity, and reliability...." As a guide in making this laboratory test they set up the following criteria (19, p. 423):

1. The test should be objective.
2. The test should be based on pertinent generalizations, principles, and facts of beginning food preparation.
3. The test should include material that cannot readily be tested in a conventional written test.
4. The test should be one that can be administered in 50 minutes.
5. The test should be one that can be administered for a minimum of cost.
6. The test should not require a long time to set up and take down.
7. The test should be one that can be administered by persons untrained in testing procedures.

The reason an objective type test was decided upon was to prevent difficulties that would naturally occur in subjective grading. To prevent this a multiple-choice test was used.

A criticism of the objective laboratory test is that skills of the student cannot be observed. Steelman and Bar-

bour (19, p. 423) believed, as does this author,

...that students who can identify proper methods of procedure and a standard product and who can select the appropriate equipment for specific jobs have had the proper experiences to be exempted from a beginning food preparation course, providing the student can also pass a valid and reliable theory test with a B grade or better."

Steelman's test (18) was set up on a station-to-station basis in a laboratory and the students had a specific number of minutes at each stop. The problem with this test was that:

1. It took too long to set up and take down.
2. A person skilled in giving a test was needed to supervise it.
3. The test was expensive to give in terms of both time and money.

It was suggested by Steelman that these difficulties could be overcome if pictures of laboratory situations were used instead of setting up laboratory situations each time the test was given.

In 1960 Cooksey (6) began work on a pretest in beginning college nutrition. The method of making this pretest was the same as Steelman's (18) except that she introduced the term -key concept- to pretest work. Tinsley and Sitton (20, p. 86) stated:

A concept is an idea which a person forms in his mind in order to understand and cope with something in his experience. It is composed of mean-

ing and feeling, which may or may not be expressed by words.

A concept is the step between objectives and generalizations and it ties them together. Johnson (13, p. 133) said:

The tremendous utility of concepts to anyone is that they divide things up. They organize the world of uncountable objectives, events, and ideas into a relatively small number of categories. Anyone who organizes the world he does business with into a consistent conceptual system has reduced tremendously the occasions for subsequent problem solving.

Concepts are of great value to anyone making a pretest.

In 1967, White (23) completed a thesis on the revision of Steelman's (18) theory pretest. It was hypothesized by White (23, p. 4) that the theory pretest could be improved as follows:

1. Reword questions not having desirable difficulty and discrimination indices as shown by item analysis.
2. Add 50 multiple-choice questions to the test in an effort to increase validity and reliability.
3. Administer pretests to a select group of college undergraduates to determine, by item-analysis, which questions should be retained for use in the refined pretest.

Hoskins (12, p. 2) developed a list of uses for a pretest which are to:

1. Permit those students with experience who rate high on the test to enroll in a more advanced course.
2. Allow more favorable placement of transfer students.
3. Enable students to better realize their strengths and weaknesses and thus increase interest in the course.

4. Assist the instructor in grouping students according to their experience and need.
5. Aid in individual guidance.

This type of test is valuable for both teacher and student.

In 1968, Musgrave (17) completed a pretest in beginning college nutrition that was started by Cooksey (6). With this test, a new era in pretest development began at Oklahoma State University. Up to this time Tyler (21) had been used as the source that aided students in developing abstract objectives into concrete test questions. However, Musgrave incorporated into her pretest Bloom's (4) new system by which objectives can be evaluated. In describing the usefulness of his taxonomy of educational objectives, Bloom, et al (4, p.1) said:

It is intended to provide for classification of the goals of our educational system. It is expected to be of general help to all teachers, administrators, professional specialists, and research workers who deal with curricular and evaluation problems. It is especially intended to help them discuss these problems with greater precision.

By using this system educators can be relatively sure that they have not deleted an important aspect of the problem they are confronting.

Use of Visual Aids in Pretests

Steelman (18) had an excellent idea when she suggested the use of pictures for a laboratory pretest. In a book by

Bachman (2, p. 3) he said:

Essentially, audio-visual materials can be helpful because of one basic characteristic: they can provide sensory experiences. Whether they are offering a new experience or recapturing a forgotten one, they may convey, through eyes and ears, a more realistic and vivid impression than words alone are likely to create or recollect.

He also stated (2, p. 7):

Although words are a convenient and economical form of communications shorthand, they may suggest sensory impressions, but audio-visual materials correct and intensify these impressions, thus adding a dimension to reality.

This indicates that when pictures are used to depict laboratory situations it is more realistic to the student than a word test could be.

In Kinder's (14, p. 380) book on audio-visual aids he points out the advantages of using sketches in putting across ideas to a class. He says that they are "simple" and "give essential features without details." This would be an advantage during the test because only objects essential to the question would be included. This could prevent the student from being distracted by trivia.

Statistical Procedures for Pretest

In the studies reported, which were carried out at Oklahoma State University, test items consisting of four distractors were used. These questions were analyzed by the method described by Davis (8). The distribution of test scores was

examined in order that the number of items answered correctly by the top and bottom 27 per cent of the tests given could be obtained. The proportion figure calculated by the method given in Davis (8) was used to find the coefficient of correlation (r) in tables in Flanagan (10, p. 348). In this manner the validity index was determined.

The reliability of each test in the studies reviewed was determined by correlating the responses of odd items against even items to obtain the reliability of half the instrument. The reliability of the whole test was obtained by applying the Spearman-Brown prophecy formula which can be employed when the reliability coefficient for one-half of the test is available (7).

CHAPTER III

METHOD OF PROCEDURE

At present, several pretests have been developed in the field of food and nutrition at Oklahoma State University. One pretest, designed for the beginning nutrition classes, FNIA 1112, has been completed and is being validated for immediate use (17). White (23) has also completed a theory pretest for the beginning food preparation classes, FNIA 2113. Validation of this pretest is in progress. The test developed by the present author is a laboratory pretest for the same beginning food preparation course. It is necessary that a student be given both laboratory and theory pretests for this subject. By using both tests it can be determined if a student has sufficient background to be placed in a more advanced class or placed in an accelerated section of the class.

A beginning foods laboratory test was attempted by Steelman (19) but it was found to be too expensive and time consuming to be practical. It was the purpose in this study to formulate an inexpensive and easily administered laboratory pretest. This was attempted by projecting sketches of

laboratory situations upon an overhead projector screen. The projected sketch also included a question with four possible answers. Each student was permitted 50 seconds to read, evaluate, and answer the question. Fifty multiple-choice questions were used throughout the pretest. Machine-graded answer sheets were used by each student to record his answers.

Laboratory Objectives and Concepts

Objectives had been previously developed for the theory part of the beginning food preparation course at Oklahoma State University. The present author concluded that a different but compatible set of objectives was needed for the laboratory since these objectives involve the practical application that must accompany the theory.

To gain a clearer understanding of the objectives for the class, this writer taught a section of the laboratory portion of the beginning foods class. Theory classes were also attended by this author to observe the interaction between the laboratory and theory portions of the class. After the objectives were developed, a copy was given to six faculty members who taught laboratory sections of the class. These people were asked to evaluate the course objectives in relation to accuracy and completeness. If more than one teacher disagreed with an objective it was rewritten or discarded.

Key concepts were developed to make the objectives more concrete and easier to use. These were checked by the class coordinator to assure that they were complete and accurate. The concepts and objectives are listed below. The objectives are designated by numbers and the concepts by letters.

Laboratory Objectives and Concepts for FNIA 2113 Family Foods

I. Develop the ability to:

1. Use proper etiquette in a meal time situation.
 - a. Serving responsibility of family members
 - b. Common table manners
2. Make use of the principles of time and motion studies in everyday situations.
 - a. Organization of abilities and skill
 - b. Time and work schedules
 - c. Arrangement of equipment
 - d. Arrangement of work space
3. Recognize standard qualities in prepared products.
 - a. Salads
 - b. Breads and cereals
 - c. Milk and milk products
 - d. Vegetables
 - e. Fruits
 - f. Beverages
 - g. Egg dishes
 - h. Meat and meat extenders

4. Choose the most economical and best quality raw products for every-day situations.
 - a. Number of servings per pound of raw food
 - b. Purchase of food supplies for a family
 - c. Variations in cost
 - d. Grading
 - e. Inspection
 - f. Labeling
5. Store a variety of foods properly.
 - a. Meat, poultry, fish
 - b. Eggs
 - c. Vegetables
 - d. Fruits
 - e. Milk and milk products
 - f. Staples
6. Plan menus using acceptable combinations of food
 - a. Principles of menu planning
 - b. Format for menus
 - c. Meal patterns
 - d. Serving sizes

II. Learn the recommended method for:

1. Using electrical and gas equipment.
 - a. Ranges
 - b. Refrigerators
 - c. Electric skillets
 - d. Toasters
 - e. Coffee pots
 - f. Deep-fat fryers

- | | |
|-----------------|--------------------|
| g. Mixers | k. Electric knives |
| h. Waffle irons | l. Griddles |
| i. Dish washers | m. Blenders |
| j. Can openers | |

2. Using utensils in food preparation.

- | | |
|-----------------------|-----------------|
| a. Meat Thermometer | u. Cooling rack |
| b. Pastry blender | v. Food grinder |
| c. Melon ball cutter | w. Dutch oven |
| d. Gelatin molds | x. Baking sheet |
| e. Timbale iron | y. Cake pan |
| f. Pressure sauce pan | z. Sauce pan |
| g. Pancake turner | a. Loaf pans |
| h. Egg poacher | b. Tea pot |
| i. Rubber scraper | c. Strainer |
| j. Vegetable peeler | d. Grater |
| k. Measuring cup | e. Reamer |
| l. Measuring spoon | f. Pie pan |
| m. Biscuit cutter | g. Knives |
| n. Potato masher | h. Mallet |
| o. Wooden spoon | i. Beater |
| p. Rolling pin | j. Tongs |
| q. Apple corer | k. Sifter |
| r. Cake tester | l. Scoops |
| s. Nut chopper | m. Spatula |
| t. Pastry wheel | n. Skillet |

3. Maintaining adequate safety and sanitation in the kitchen.
 - a. Dish washing
 - b. Care of equipment
 - c. Safe use of mechanical equipment
 - d. Safe use of utensils
 - e. Proper tasting methods
 - f. Clean hands
 - g. Hair net and uniform

III. Have general knowledge of:

1. Principles of food preparation.
 - a. Reasons for cooking
 - b. Cooking temperatures
 - c. Osmosis
 - d. Fat break-down
 - e. Color changes in vegetables
 - f. Leavening agents
 - g. Prevention of darkening
 - h. Protein cookery
2. A variety of uses of available food products.
 - a. Convenience foods
 - b. Planned left-overs
 - c. Seasonability of food
 - d. Staples

3. Types of informal table service and their uses.
 - a. Family service
 - b. Plate service
 - c. Buffet service
4. Roles of federal and state agencies in protection of our food supply.
 - a. FDA
 - b. USDA

IV. Have specific knowledge of:

1. Common terms used in food preparation.

- | | |
|-------------------|------------------|
| a. Aspic | p. Mince |
| b. Bake | q. Muffin Method |
| c. Barbeque | r. Pan-broil |
| d. Baste | s. Blend |
| e. Batter | t. Braise |
| f. Beat | u. Bread |
| g. Biscuit method | v. Broil |
| h. Blanch | w. Caramelize |
| i. Garnish | x. Chop |
| j. Glaze | y. Cream |
| k. Grind | z. Crouton |
| l. Julienne | a. Pan-fry |
| m. Knead | b. Sear |
| n. Marinate | c. Score |
| o. Meringue | d. Scale |

- | | |
|------------------|----------------|
| e. Roux | p. Escallop |
| f. Roast | q. Flake |
| g. Puree | r. Fold-in |
| h. Poach | s. Simmer |
| i. Pastry Method | t. Steep |
| j. Pressure cook | u. Steam |
| k. Deep-fat fry | v. Stew |
| l. Dice | w. Syneresis |
| m. Dough | x. Timbal case |
| n. Dredge | y. Torte |
| o. Dripping | z. Whip |

2. Table settings and their uses.

- a. Laying the cover
- b. Table appointments
- c. Serving table or cart
- d. Traffic pattern

3. Information needed when reading a recipe.

- a. Abbreviations
- b. Equivalent measures
- c. Yield

Generalizations

A good set of generalizations was formulated by Steelman (19, p. 36) when developing her pretest. These were accepted by this author. Steelman's Generalizations for

FNIA 2113 Family Foods are presented here.

Theory Generalizations for FNIA 2113 Family Foods

1. If meat has been inspected and graded by a government agent, it can be considered safe to eat at the time of inspection.
2. When comparing meat prices, the cost of the edible lean should be used rather than the cost per pound.
3. Because neither palatability nor food value correspond to market price, the cheaper cuts of meat may be a more economical source of lean than are expensive cuts.
4. If beef is of good quality, it is bright red in color, it is fine grained and smooth, and the fat is creamy white, firm, and brittle.
5. If veal is of good quality, it is grayish pink, the texture is fine grained and smooth and the interior fat is firm and brittle and is grayish or pinkish-white in color.
6. If lamb is of good quality, it is pinkish-red in color, fine grained and smooth, the fat is firm, brittle, and white or pinkish in color and the bones are soft, red, and spongy, and show cartilage.
7. If pork is of good quality, the flesh is a grayish-pink color, fine grained, and the fat is firm and white but not brittle.
8. If meat from older animals is selected, it will usually be less tender than meat from younger animals, since the muscle fibers are more developed in an older animal.
9. If a meat cut is from a portion of the animal that has been exercised a great deal, it will tend to be less tender than cuts from the little-used parts of the animal.

10. Because moisture and heat are conducive to bacterial action, meats should be covered lightly to allow drying and should be stored in the coldest part of the refrigerator.
11. Because ground meats are easily penetrated by bacteria, they should be used as soon as possible.
12. Because flesh foods are highly perishable, they are readily subject to new contamination after cooking even though the original pathogenic organisms were killed when the meat was cooked.
13. Because particles of the bone and foreign particles may be on the surface of the meat, it should be wiped with a damp cloth before cooking.
14. If cut meats are dipped in water, there will probably be a loss of some of the soluble constituents of the meat.
15. If meat is seared before roasting, a greater loss of juices than in unseared meat may result due to the high temperature used.
16. It is advisable to apply salt to steaks and chops after they are browned, because salt retards browning of meat.
17. There is no advantage in salting roasts before serving, because salt only penetrates a short distance in meat.
18. A meat thermometer is the best known way to determine the state of doneness of the meat, because the internal temperature is directly related to the stage of doneness.
19. Because pieces of meat of the same weight may vary enough in shape, thickness, and in proportion of meat to bone as to cause a difference in roasting time, cooking time charts should be used only as guides to estimate the total cooking time.

20. When meat is removed from the oven, the internal temperature will rise a few degrees, therefore the meat should be removed before the desired stage of doneness is completely reached.
21. When cooking frozen cuts of meat, allow about one and one-half times as long to cook as is necessary for similar cuts of unfrozen meat.
22. If drip and cooking waters are utilized, the food values of meat are well retained.
23. If a cut of meat contains a minimum of connective tissue, it is considered a tender cut of meat and may be cooked by dry heat methods.
24. When cooking meat in the oven by dry heat, a constant low temperature should be maintained to prevent excessive shrinkage and loss of juice and flavor.
25. If a cut of meat is boneless, the cooking time will be longer than for meat with bone, because bone aids in heat penetration.
26. If a good layer of fat covers a roast, some evaporation will be prevented since water does not tend to pass through the layer of fat.
27. When the fat is found well distributed throughout the muscle fibers, the cut of meat will usually be tender.
28. When meat is cooked at low temperatures, the muscle fibers hold together better and there is less crumbling and falling apart of the meat than when it is cooked at high temperatures.
29. When moist heat methods are used to cook meat, the temperature of the connective tissue rises to the point where gelatin is formed much more rapidly than in dry heat, because water and steam are much better conductors of heat than air.

30. If moist heat methods are used to cook meat or poultry, the water should not be hotter than simmering to avoid the toughening effect of high temperature on the fibers.
31. If beef is cooked only to the rare stage, it will be more juicy and flavorful and there will be a larger number of servings than in meat cooked to the well-done stage.
32. Because pork that has not been specially treated may contain trichinae, it is wise to cook it to the well-done stage.
33. Because poultry flesh is often too shallow to insert a regular meat thermometer, it is often difficult to determine the stage of doneness.
34. If no thermometer is used for testing the doneness of poultry, the bird will be done when the joints can be moved easily, especially the thigh joint.
35. Because the legs and wings of poultry are small in relation to the body of the bird, they cook more rapidly.
36. If the legs and wings of poultry are tied close to the body, over-drying can be minimized.
37. If the breast is placed down when roasting poultry, the fat on the back will aid in basting.
38. If the natural form of fish is to be retained, it must be carefully handled and not overcooked.

Eggs

1. If an egg is fresh, the yolk will hold its shape in the center, the white will be more or less firm, the odor will be fresh, and the color will be "good".

2. If the protective, dull coat of the egg shell is washed off before storage, the porous shell may then permit odors, flavors, bacteria, and mold to enter the egg and may permit greater evaporation from the egg.
3. Because the egg can be contaminated from substances on the shell, it is wise to wash all eggs just before breaking the shell.
4. When eggs are chilled for two or three weeks in the refrigerator, no noticeable changes in the flavor of the egg can be detected even though the egg will change in form to some extent.
5. Because the protein in egg yolk coagulates in air, unbroken egg yolks should be covered with water in a tightly covered container in the refrigerator.
6. When storing egg whites, cover tightly and place in the refrigerator to prevent drying and spoilage.
7. Because eggs have a high protein content, they should always be cooked at low to moderate temperatures to prevent toughening of both yolk and white.
8. If an egg is taken directly from the refrigerator, it will hold its shape better for frying than eggs held at room temperature.
9. If hard cooked eggs are immersed in cold water immediately after cooking, they tend to peel easier and there is less discoloration due to overcooking.
10. If prepared dishes containing a high percentage of eggs are over cooked or cooked at too high a temperature, syneresis or weeping of the curd may occur.
11. If water is used as a heating medium instead of air, baked custard products will be more evenly cooked.

12. When sugar is combined with eggs, the coagulation temperature is raised and more time is required for cooking.
13. When salt and acids are combined with eggs, the coagulation temperature is lowered and less time is required for cooking.
14. When poaching an egg, hot water should be used to coagulate the surface of the egg and protect the interior from the solvent action of the water.
15. Since the fat in yolks greatly interferes with the whipping quality of the whites, great care should be taken to keep all of the yolk out of the whites.
16. If egg whites are at room temperature, they are less viscous and tend to whip better and give greater volume.
17. When egg whites are held after beating, the foam tends to separate and cannot be beaten so lightly again.
18. If an egg white foam is over beaten, the air cells may collapse and give a heavy compact end product.
19. When eggs are used as a leavening agent, their effectiveness will depend upon the amount of air beaten in and retained during the process of food preparation.
20. When egg whites are frozen or dried, their foaming properties are not destroyed.
21. Because eggs will form thin, stable films around tiny globules of oil, they are valuable as emulsifying agents.
22. Because food poisoning develops easily in moist, nonacid foods, cooked egg dishes should be kept stored in the refrigerator.

Milk and Cheese

1. Because the pasteurizing process destroys disease causing micro-organisms, pasteurized milk is considered safe to drink if it has been handled properly in the home.
2. Because milk is an excellent medium for bacterial growth, it should be stored in the coldest part of the refrigerator.
3. If milk is boiled, it has a "flat" flavor due to the loss of the dissolved gases in it.
4. Because milk contains lactose, a sugar, it scorches easily and should be cooked slowly.
5. Because non-fat dry milk solids are inexpensive, wholesome, low in calories, and high in nutritive value, it is wise to consider them for drinking purposes as well as for cooking.
6. When cooking cheese, a protein food, a low temperature should be used to prevent toughening and stringiness of the protein, and separation of the fat.

Sauces

1. When a starchy material is used for thickening a liquid, the starch granules need to be separated before the hot liquid is added to prevent lumps in the mixture.
2. If each particle of starch is not surrounded by liquid, it cannot swell to its maximum capacity.
3. If starch is overcooked, it converts to dextrin which has less thickening power than the starch.
4. Because acid converts starch to dextrin, it is advisable to cook the starch in the sauce first and add the acid last.

Fruits and Vegetables

1. If vegetables and fruits are properly prepared, cooked, and served, they will help contribute valuable nutrients to the diet.
2. When fruits and vegetables are fresh and attractive, their vitamin content will usually be higher than those that are wilted and off-color.
3. If vegetables are over-mature, there is usually more waste and a longer cooking time is needed than is required for young, slightly immature products.
4. When vegetables are harvested, enzymes are set free which hasten the destruction of certain of the vitamins and cause other forms of deterioration.
5. Because the maturing action continues after harvesting, fresh vegetables, except tomatoes, are considered to be best when harvested at a slightly immature stage.
6. Because deterioration of fruits and vegetables is due primarily to oxidation, generally the lower the temperature, the shorter the time, and the less exposure to oxygen during storage results in a decreased deterioration rate.
7. When held in common storage and in refrigeration above freezing, natural plant products continue to live and undergo some of the changes associated with increasing maturity.
8. If vegetables are stored at low temperatures, the development of pathogenic bacteria and those which make food inedible is retarded.
9. When root vegetables are stored in a cool, dry, well-ventilated place, they will tend to retain their normal characteristics.

10. If leafy and other fresh vegetables are trimmed to remove inedible parts, washed, and stored in a covered container in the refrigerator, dehydration and loss of nutrients will be retarded.
11. If canned goods are to undergo minimum deterioration, they should be stored in a cool, dry place.
12. If a can has been opened, it is safe to refrigerate unused portions of the food in the original can as it has an enamel finish on the inner surface.
13. If reconstituted frozen fruit juices are covered and kept in the refrigerator, they will retain most of their ascorbic acid value for three or four days.
14. If citrus fruits are covered to provide a moist atmosphere, they will not dry out so readily.
15. When held at refrigerator temperatures, the avocado and banana discolor and lose the power of ripening.
16. Because root and tuber vegetables often contain embedded dirt, they should be scrubbed with a vegetable brush before being cooked.
17. When washing leafy vegetables, care should be taken not to bruise the leaves to avoid a loss of nutrients and a less attractive appearance.
18. If warm or hot water is used for washing green leafy vegetables, wilting will occur.
19. When removing the skin from fruits and vegetables, care should be taken to remove as little as possible because many of the nutrients are located just underneath the outer skin.

20. If the skin of a fruit or vegetable is undesirable, a very thin layer can be slipped off after cooking or the raw food can be scraped or thinly pared to avoid excessive loss of nutrients.
21. Because of the oxidative changes that occur at the surface of cut fruits and vegetables, slicing or other partitioning of plant materials should be done just before they are to be used.
22. If uncooked fruit and vegetable products are ground or mashed, a great loss of flavor, color, and ascorbic acid usually occurs.
23. If cut fruits and vegetables are exposed to the air, ascorbic acid may be lost by oxidation.
24. If pared or cut fruits and vegetables are allowed to soak in water before cooking, water soluble vitamins and certain of the minerals may be lost by dissolving in the liquid.
25. If berries are washed before the stems and hulls are removed, there will be a smaller loss of nutrients than if they are washed after hulling.
26. If berries are sliced rather than crushed, there will be less ascorbic acid lost.
27. If fruits and vegetables are marinated or treated with an acid such as vinegar or lemon juice, the ascorbic acid will be protected and browning will be prevented.
28. If a plant material is heated in a moist atmosphere the tissues will be softened and if heated for a long enough time, the vegetables or fruit will fall apart.
29. Because the softening of the plant structure during cooking allows many of the nutrients and flavoring substances to dissolve in the cooking water, only the amount of water that can be consumed with the food should remain at the end

of the cooking period.

30. If excessive cooking water is not evaporated or recovered and used in soups, gravies, or other foods, much of the vitamin and mineral value contained in the vegetables will be wasted.
31. When vegetables are cooked properly, their original shape, flavor, and color will be retained.
32. If heat is reduced to maintain a slow steady boil, there will be less disintegration of the vegetable or fruit and less vitamin destruction than when they are cooked at a rapid boil.
33. If a large amount of surface area is exposed, there will be a greater loss of nutrients than if a smaller surface is exposed.
34. If salt is added at the beginning or the midpoint of the cooking period, the texture and flavor of most vegetables will be improved.
35. If a covered kettle or steamer is used to cook fruits and vegetables, the intensity of the flavor tends to increase, while an open kettle allows some volatile flavoring substances to escape.
36. If vegetables are boiled in their skins only a slight loss of soluble material occurs.
37. If vegetables are cooked in a pressure saucepan, time, fuel, flavor, color, and usually nutrients will be saved due to the short cooking time required.
38. Because canned vegetables are already thoroughly cooked, they need only to be heated or chilled to improve palatability.
39. If the liquid from canned vegetables is evaporated to the desired quantity by rapid boiling in an open container before the vegetables are added, the nutrient and

flavor losses from the vegetable to the liquid will be offset.

40. When green vegetables are cooked in the presence of an acid, they tend to turn olive-drab.
41. When the cooking solution is alkaline, green vegetables tend to be bright green.
42. If green vegetables are cooked uncovered during the first few minutes, volatile acids that dull their color will be allowed to escape.
43. When red, purple, blue or violet vegetables are in an acid solution, the red ones retain their original color and the others tend to turn red.
44. When red, purple, blue or violet plant materials are in an alkaline solution, they retain their blue color or tend to turn blue.
45. If red vegetables are cooked covered and in their skins, there will be a greater preservation of the volatile acids and the red color.
46. When white vegetables are cooked in acid solutions they tend to retain their white color.
47. If white vegetables are cooked in alkaline solutions they tend to turn yellow.
48. If the yellow vegetables are exposed to small amounts of acid or alkali, there will be little if any color change.
49. If yellow vegetables are overcooked and the sugary juice of the vegetable is scorched, darkening will occur even though the coloring matter in yellow vegetables is very stable under ordinary conditions.
50. If vegetables are preserved by freezing, there is usually a greater retention of fresh flavor, texture, color, and nutritive value than if they are preserved by any other known method.

51. If frozen foods are to retain a high percentage of their nutrients and their good eating quality, they must be stored near 0°F.
52. When most vegetables are cooked without thawing, they retain their best volume, shape, texture, color, flavor, and food value.
53. If vegetables are thawed prior to cooking, the package should be unopened for best retention of flavor and nutritive value.
54. Frozen greens are best partially defrosted before cooking to avoid over-cooking the outer leaves before the inside of the block is defrosted.
55. If corn on the cob is not defrosted completely before cooking, the cob will not thaw during the cooking process.
56. If fruits are cooked in a sugar sirup, they tend to hold their shape better than when cooked in water.
57. When fruits are cooked in a sirup, the cells take up sugar by osmosis; the fruit becomes more transparent and may tend to shrink slightly.
58. If excess sugar is used with cooked fruits, the delicate flavors will be masked.
59. Because dried fruits have a high sugar content, little sugar needs to be added for sweetening purposes.
60. If a vegetable contains a high water content and a small surface area, it will lend itself to baking.
61. If skins of vegetables are oiled and wrapped in foil before baking, the skins will tend to be soft due to the entrapped steam.

62. When fruits and vegetables are baked in their skins, the steam which is trapped under the skins cooks the interior.
63. If a fruit or vegetable requires very little cooking, broiling is a suitable method to use.
64. When vegetables are fried, the fat should be hot so that a minimum amount of it is absorbed.
65. If vegetables are low in starch and attractive in appearance, they are often good when eaten raw.

Salads and Salad Dressings

1. Because many salad materials are eaten raw, it is essential that they are thoroughly washed.
2. If a watery salad is to be prevented, all materials need to be carefully dried before combining them.
3. If the pieces of a salad are large enough to keep their identity, yet not so large that they are difficult to eat, they will tend to be more attractive and appetizing.
4. Because simple, natural salad arrangements are difficult to improve upon, it is wise to avoid grotesque and fixed arrangements.
5. If salad greens are torn rather than cut, there will be less bruising and discoloring of the vegetables.
6. Because foods with a strong flavor mask more delicate flavors, they should be used sparingly.
7. When selecting a dressing for a salad, consideration should be given to its flavor and consistency in relation to the other parts of the salad.

8. Because the liquid, acid, and fat in a salad dressing will not mix, but one is dispersed in the other, the dressing is an emulsion.
9. Oil at room temperature is desirable when making a dressing, because cold oil is more difficult to break up into small globules than is warm, less viscous oil.
10. After a permanent emulsion is formed, it should be stored in the refrigerator because chilling thickens and stabilizes the product.
11. If salads are stored covered in the refrigerator before serving, there will be less drying, absorption of odors and giving off of odors than if stored uncovered.

Cereals

1. When cereal is cooked, the rate of digestion and palatability of the cereal are improved.
2. Because quick-cooking cereals have been partially cooked before packing, they require a shorter cooking period than untreated cereals.
3. If cereals are cooked slowly, they tend to develop an improved flavor and a softer fiber than if they are cooked rapidly.
4. When all particles of the cereal are equally exposed to the heat and liquid, a desirable uniform gelatinous mass will be formed.
5. If cereals are cooked without stirring, the original form of the cereal can be maintained during the softening process.
6. Because starch of cereal reaches its capacity for maximum absorption of water several degrees below the boiling point of water, a double boiler may be used successfully in cooking cereals.

7. If salt is added to the water at the beginning of the cooking period, the flavor will be improved and the original shape of the cereal will be maintained better than if the salt is added after the cereal is cooked.
8. Because most brands of cereal vary in the amount of water required and the time necessary for cooking, it is recommended that this information be obtained from the package.
9. When ready-to-eat cereal cartons are opened, the remaining cereal should be closed as tightly as possible and stored in a warm dry place to prevent the absorption of moisture.

Batters and Doughs

1. When the ratio of flour to water is such that mixtures will pour or drop easily from a spoon, they are called batters.
2. If a mixture is thick and can be rolled or kneaded, it is a dough.
3. When cakes contain fat and are leavened with baking powder, steam, and air, they are generally called butter cakes.
4. If a cake does not contain fat and is leavened only with air and steam, it is classified as a sponge cake.
5. When breads are leavened with steam, air, or baking powder, they are usually called "quick" breads.
6. When mixtures have a high proportion of liquid and are baked at a high oven temperature, steam is rapidly formed and acts as a leavening agent.
7. When baking powder is used as a leavening agent it must be dissolved in a liquid before it can release carbon dioxide

which aids in leavening the mixture.

8. When yeast is in the presence of moisture, food, and favorable temperatures, it multiplies rapidly and releases carbon dioxide which aids in leavening.
9. If the dough becomes too hot, the yeast cells will be killed, but if the dough is too cool yeast growth will be retarded.
10. Because shortening increases tenderness and aids in leavening, it is used in most batters and doughs.
11. When breads are made with milk they stale less rapidly than do breads made with no milk.
12. Because wheat flour contains two proteins which form gluten, it is considered superior to all other flours for bread making.
13. If all-purpose flour is substituted for cake flour, the amount called for should be decreased.
14. If the gluten is made elastic by thorough kneading and mixing, it can expand and hold within it the gas bubbles formed by the leavening agents.
15. Lightness, the distinctive characteristic of batters and doughs, is produced when heat expands the air or other gases trapped in the elastic gluten.
16. If a batter or dough is overmixed, the resulting product may have tunnels, peaks, a smooth crust, and an increased tendency to stale readily.
17. When a mixture is understirred, sugary crusts, concave tops and a coarse texture may result.
18. If baked products are stored in cool, dry places, staling and molding will be retarded.

19. If muffins, biscuits, waffles, and griddle cakes are stored, they will probably need to be refreshed by heating before being eaten, since they stale so readily.
20. When filling a cake or muffin pan, about one-half to one-third of the depth is generally allowed for expansion.
21. When baking pans are staggered in the oven there can be free circulation of heated air around the pans.
22. If a short baking time is required, pans made of materials that conduct heat rapidly will generally give better browning.
23. When heavy pans made from a material such as glass, iron, and enamel ware are used, the products tend to have a thick heavy crust and in some cases are misshaped.
24. Because shiny pans reflect the radiant heat, a longer baking time may be required than with dull pans.
25. If shiny pans are used, a product with a greater volume may result because it has a longer time to expand before the crust is formed.
26. Because of increased depth, products baked in deep pans require lower temperatures and longer baking times than do products baked in shallow pans.

Pastry

1. When the flour particles are separated from each other by means of fat, the development of gluten will be prevented and the pie crust will be more tender.
2. If large fat particles are rolled between the layers of dough, rather than mixed finely in the dough, the crust will tend to be more flakey.

3. If too much water is used in relation to the amount of fat in pie dough, the flakiness of the pastry may be decreased.
4. If pastry is handled too much, it tends to become tough.
5. If the dough is allowed to stand a few minutes before rolling, the extensibility and elasticity will be increased, making it easier to handle.
6. If pie crusts are pricked with a fork before baking, blistering of the crust will be prevented.

Beverages

1. If water for drip coffee and tea is boiled excessively, it will be flat and insipid and the flavor of the tea and coffee will be affected.
2. When coffee or tea is boiled, there is a greater extraction of tannin which produces a bitter flavor and also causes excessive loss of flavor.
3. Because some aluminum and pewter pots impart a metallic taste to coffee; glass, pottery, enameled ware or stainless steel is recommended for making these beverages.
4. Because unbrewed tea and coffee readily lose their aromatic flavors and fragrances, they should be stored in tightly covered containers.

General

1. When buying food, consideration should be given to unit cost, amount of waste, nutrients supplied by the food, and time, energy, and further expense required for its preparation.
2. When carefully prepared, a food budget should help people to eat economically, to buy intelligently, and to live comfortably.

3. When prepared or partially-prepared foods are used, the cost in dollars is usually increased.
4. When time and money are both considered in the cost of food, convenience foods may be less expensive than home-prepared foods.
5. When equipment is carefully selected and conveniently arranged, much time and energy may be saved in food preparation.
6. When planning menus, consideration should be given to the food already on hand, food available to be purchased, the time needed to prepare the food and the cost of the food.
7. When preparing a meal, a work schedule, either mental or written, will aid in timing so that all foods will be ready for use as desired.
8. If food served is nourishing but unappetizing, nutritional deficiencies may occur because the food is not eaten.

Because the objectives were not the same for the laboratory and theory pretest a more extensive set of generalizations were needed. These were used in addition to Steelman's generalizations in making the laboratory pretest. When the additional generalizations were completed a copy was given to each laboratory teacher. These were checked for accuracy and appropriateness for this class. These generalizations are listed below.

Additional Generalizations for FNIA 2113 Family Foods

A. Serving responsibilities

1. When putting plates on the table, place thumbs on

the edges and fingers close together underneath to avoid touching the surface on which food will be placed.

2. In most cases place and remove dishes from the left with the left hand.
3. Dishes that are on the right side of the cover such as beverage cups should be placed and removed with the right hand and from the right side.
4. When a guest is to serve himself, offer food from the left side with the left hand.
5. When the waitress offers food, she holds it at a height, distance, and angle convenient for the person being served.
6. When refilling glasses, do not lift them from the table.
7. Use a service napkin to catch the drip from the pitcher when pouring liquids.
8. When placing, passing, or removing several small articles and extra pieces of flatware, use a service napkin to hold them.
9. In an informal meal all dishes from a cover can be cleared at one time.
10. Before placing dessert, remove all dishes--both serving and individual.

B. Common table manners

1. Sit comfortably erect in your chair without resting your arms on the table.
2. Except when eating, the hands should remain in the lap.
3. Take your napkin from the table after the hostess has removed hers.
4. Spread the napkin, if large, half unfolded upon the lap. With the smaller size, it is permissible to unfold it completely.
5. Leave the napkin on the lap at the close of the meal until the hostess has placed hers on the table.
6. At the end of the meal place the napkin loosely on the table at the left side of the plate.
7. If a small number of people are being served, wait until all at the table have been served before beginning to eat.
8. As a general rule, pass food to the right and offer food with the left hand.
9. Eat slowly and quietly and never talk with food in the mouth.
10. When eating soup, the spoon is dipped away from the person and the liquid sipped from the side of the spoon.
11. When eating soft foods, as desserts, the spoon is

dipped toward the person and the food is eaten from the tip of the spoon.

12. When cutting food, hold the knife in the right hand and the fork in the left hand with the tines down.
13. Break off a small piece of bread before spreading.
14. After a spoon has been used to stir a beverage it is placed on a saucer or plate.
15. If a salad has pieces in it that are larger than can be eaten in one bite they may be cut with a knife.
16. The first person to start eating the meal is the hostess.
17. When eating from a dish that has a liner, the flat ware is rested in it when not in use.
18. When the meal is finished, place the knife and fork in the center of the plate. The knife should have the cutting edge facing toward the person and the fork should be in front of the knife with the tines up.
19. Do not reach in front of a person to obtain a desired article; ask to have it passed.
20. Take care to finish a course about the same time as the others.
21. Ask to be excused if you must leave the table before the others.

C. Time and motion study

1. The arrangement of the food preparation equipment should contribute to efficient work procedures.
2. All of the equipment related to one activity should be grouped together, whenever possible.
3. When making time and work schedules it is important that all foods be ready to serve at the same time.
4. When making a product, use as few pieces of equipment as possible.
5. When waiting for food to cook, use the time for setting the table or cleaning up.
6. When using trays to set the table, place the items which are used first on top.
7. Make sure that the foods chosen can be prepared in the amount of time available.

D. Purchasing raw food

1. When buying foods in the uncooked state the amount of waste must be considered.
2. Since foods are reduced in volume when cooked, enough food must be purchased to allow for this.

E. Labeling

1. The Food, Drug, and Cosmetic Act sets the standards for labels on food products.

F. Principles of menu planning

1. Select foods that meet the nutritional needs of

those for whom the meal is planned, using the Daily Food Guide as a basis.

2. Consider foods for each meal in relation to food plans for the day.
3. Select foods suitable for the type meal served.
4. Consider the personal likes and dislikes of the group being fed.
5. Select foods that combine pleasingly.
6. Have contrasts in the foods served together.
7. Have daily variety in foods eaten.
8. Select foods in season when possible.
9. Avoid serving more than two dishes of concentrated food in any one meal.
10. Select foods that are easily served.
11. Select foods that can be prepared in the time available.
12. Select foods after due consideration of the equipment on hand.
13. Consider the food cost in relation to the money allowance for the day.

G. Menu form

1. Capitalize all words except articles and prepositions.
2. The items that compose meals should be grouped by courses, beginning with the first.

3. When an item on the menu has a special accompaniment, either place the main item to the left and the accompanying item to the right, or you may center the main item and write the accompanying item below.
4. When a dish is accompanied by two or more menu items, write the main dish in the center and the accompaniment on each side of it, or opposite each other on the line below.
5. The beverage appears in the menu as the last item of the course with which it is served.
6. Such items as butter, cream, sugar, or salad dressing are not written on menus unless they are particularly interesting or different.
7. Plan the spacing and arrangement of the items on the menu so that the written menu is symmetrical.
8. Allow extra spacing between menu courses; this extra space is often omitted in menus printed in books, magazines, and newspapers, in order to save space.
9. There is a wide variety of meal patterns to use when planning menus.

H. Serving sizes

1. The average fruit juice glass holds one-half cup or four ounces.
2. The usual serving size of cooked cereal is one-half

- to three-fourths to one cup.
4. The average serving size of raw meat is four ounces without bone.
 5. Roasted meat is usually sliced one-eighth to one-fourth inch thick.
 6. The average serving of starchy sauce is usually two to four tablespoons.
 7. A serving of cooked vegetables is usually from one-third to one-half cup.
 8. When serving a casserole as a one-dish meal, one cup is usually served. But if served with other foods the average serving is one-half to three-fourths cup.
 9. When serving a dessert of cooked fruit, custard or ice cream, one-half cup is considered adequate.
 10. When preparing a hot beverage, eight ounces of liquid equals one and one-half to two servings.

I. Reasons for cooking

1. Food is cooked to improve flavor, digestibility, and texture and to increase palatability and variety.

J. Meal service

1. Family-style is the simplest form of service in which the food is placed on a table in serving dishes at the beginning of the meal and each person at the table helps himself to desired portions.

2. Buffet service is a style in which all of the food and dishes are put on a table and everyone walks by and serves himself.
3. Plate service is used when all of the food, except desert, is placed on one plate and served to the individual.

K. Table appointments

1. A cover, one individual's place at the table, consists of the dinnerware, beverageware, flatware, and linens.
2. A cover is usually twenty to thirty inches wide.
3. Linens include the tablecloths, mats, and other table covers and napkins, regardless of fiber, laid on the dining table.
4. The overhang of a table cloth should be 10 inches with the opposite sides of the table the same depth.
5. Lay placemats flush with the table edge or at a distance of not more than one and one-half inches from the table edge.
6. Preferred shape for the napkin is the rectangle; the square shape is acceptable but sometimes less pleasing.
7. Usually, the napkin is laid at the left of the cover beside the fork or forks; however when covers are close together, napkins can be placed in the center

- of covers on the dinner plate.
8. Place the napkin so that the bottom edge is closest to the table edge and lies on an imaginary line with the handle-ends of flatware and rim of plate.
 9. The traditional position of the napkin is with the open corner at the lower right.
 10. Dependent upon the size of the placemat and napkin, the napkin may be laid on the mat, partly on the mat and partly on the table or entirely off the mat.
 11. The twelve-inch napkin is customarily used for breakfast and lunch and the eighteen-inch, or larger, napkin for dinner meals.
 12. Decorations need not be placed in the center of the table.
 13. Keep decorations low; people should be able to see and converse across the table.
 14. Decorations on the buffet and tea table are larger and taller than dinner table decorations because they are viewed from above.
 15. With the exception of the tea table, candles are placed and lit only after dusk.
 16. Usually no more than three pieces of flatware are placed at either side of the plate.
 17. The use of unneeded pieces of silver is ostentatious and should be avoided.

18. Lay pieces of flatware in the order of use from the outside toward the plate.
19. Pieces of flatware are laid close together, but not touching.
20. Traditionally all cover pieces are laid so that the bottom edge would touch an imaginary line parallel to the edge of the table and about an inch to an inch and a half from the table edge.
21. Lay the dinner knife to the right of the plate with the cutting edge directed toward the plate.
22. Lay spoons with the bowl facing up at the right of the knife.
23. Always place a fork with the tines facing up.
24. A fork for eating seafood is placed to the right of any spoons in the cover because this fork is used in the right hand only.
25. Lay the dinner fork nearest the plate and the salad fork to the left of it if the intention is that the salad be eaten before the main course.
26. It is not necessary to provide a salad fork when the salad accompanies the main course.
27. If a dinner knife will not be required for eating a simple family meal, it can be omitted from the setting. One may then lay the fork in the knife's position.

28. Should a menu not include a salad, the dessert fork can be laid to the right of the dinner fork.
29. The flatware used for dessert may be placed, just before dessert is served, to the right of the cover.
30. When choosing serving pieces, pick those that will be easiest and most efficient to use.
31. If only one serving tool is provided, lay it to the right of the serving dish or platter.
32. When two serving tools are provided, lay the one that will assist to the left of the dish containing food and the one that will pick up the food to the right. These may also be placed to the left and right of the cover of the person serving.
33. Lay the serving tools for small containers of food passed at the table such as butter, jelly, and pickles to the right of a dish that has no underliner, but on the underliner when one is used.
34. Pick up tumblers and footed ware at the base and stem ware by the stem.
35. Use coasters under beverage glasses whenever humidity and temperature favor the condensation of moisture on glasses.
36. Place the water glass at the tip of the knife or a little to the right or left of the knife, depending on the breadth of covers, width of table, and number

of glasses to be placed.

37. Glasses of milk, when water also is served, are placed to the right and a little in front of the water glass, that is, a little closer to the table edge.
38. Always serve water at the cover as a second beverage.
39. Place a saucer or small plate under a glass of iced tea or coffee as a repository for a spoon. If an underliner is not provided for the glass, the spoon should be placed on the dinner or salad plate.
40. Place the bread-and-butter plate at the left of the cover near the tip of the fork.
41. A salad may be placed in any of several positions.
 - a. If no bread-and-butter plate is at the cover, place the salad at or near the tip of the fork.
 - b. When a bread-and-butter plate is included in the cover, the salad may be placed to the left of the dinner plate and a little below the bread-and-butter plate.
42. When a table has been completely set, except for the food, chairs should be placed with the front of the seats flush with the table edge.

L. Serving table or cart

1. The presence of a small chest, tea cart, or buffet

in the dining area promotes ease and speed in table service.

2. Cover the serving table with a runner or one or two placemats to muffle the sound of dishes and to protect the surface.
3. Keep a small tray nearby to use when clearing and placing courses at the table.
4. Place the dishes and flatware needed to serve a dessert and beverage from the table, and an extra cover, on a serving table or tray near the table.
5. Place a water pitcher and a drip-napkin on a table or tray convenient to the family table.
6. Do not completely cover the service table with appointments since it has a real function during the removal and placement of courses.
7. Leave hot pads and salts and peppers, which have been removed from the dining table, on the service table or cart.

M. Abbreviations and equivalent measures

1. The meanings of abbreviations need to be understood in order to accurately prepare recipes.
2. Equivalent measures need to be known if substitutions are to be made in a recipe.
3. When planning a meal, the number and size of the servings produced by a recipe is an important consideration.

Mechanics of Making the Test

Before formulating the questions for the laboratory test a table of specifications was developed to help the author decide how many points should be given to each objective. (See appendix). Multiple-choice questions were then developed from this table. Most authorities agree that multiple-choice questions are the best type of objective test question to use. Steelman (18, p. 25) developed criteria to use when writing multiple-choice questions. These were used in this pretest and are as follows:

1. The lead or stem may be in the form of a direct question or an incomplete statement.
 - a. If an incomplete statement is used, it should be meaningful in itself and imply a direct question.
 - b. In general, the incomplete sentence form seems to provide greater economy of language.
2. As much of the item as possible should be included in the lead.
3. The lead should generally be stated in positive terms. If negative items are used they should be underlined.
4. A single definite problem should be presented in the lead.
5. Dangling participles or gerunds should not be used in the lead.
6. Each item in a test should be independent of other items.
7. All of the alternatives should follow both plausibly and grammatically from the statement of the problem.
8. The answers should be parallel in grammatical form.
9. The alternatives should be made as brief as possible.

10. The alternatives should be similar.
11. The distractors should be plausible.
 - a. Make distractors as familiar as the correct answer.
 - b. Relate to the same concept as the correct answer.
 - c. Make as reasonable and natural as the correct answer.
12. The arrangement of alternatives should be uniform throughout the test. One under the other is the best arrangement.
13. The length of the alternatives should not vary systematically with their correctness.
14. The position of the correct answer should not vary systematically.
15. "None of the above" as an alternative should be used only with definite facts.
16. "All of the above" gives answer if student knows that two answers are right.
17. Compound responses should be avoided.
18. If alternatives contain two pairs of opposites, the members of each pair should appear together to avoid confusing the subject unnecessarily.
19. Irrelevant inaccuracies should be avoided.
20. Unusual vocabulary should be avoided.

Pictures of laboratory situations were found in books, magazines, and pamphlets to be used in each question. These questions, with their pictures, were given to the Graphic Arts Department, Oklahoma State University, where transparency negatives were made.

To assure the clarity and wording of the questions, the

test was administered to six girls to determine if any questions were too easy, too hard, or had some ambiguity in them. The girls met the requirements for taking the test as they were all college sophomores and had never had a college course in food preparation. Initially, the girls were given one and one-half minutes to answer each question. This proved to be too long and they soon became bored. No student took longer than 45 seconds to answer a question. Because of this the time was reduced to 50 seconds. After the preliminary test was given, the corrected negatives were returned to the Graphic Arts Department to be processed.

Administration of the Test

The test consists of 50 transparencies, individual answer sheets and special marking pencils. Each question is depicted on one transparency--a total of 50 questions on 50 transparencies. The remaining transparency depicts the following information:

Directions

There are 50 questions in this test; read each one carefully. Each question has four (4) possible answers. Sketches are used to display either the question or possible answers. The questions will be shown on a screen and you are to mark the best possible answer on your answer sheet. There is only one right answer to each question.

Time Limit:

There will be 50 seconds allowed per question. Mark all answers on the answer sheet provided

with special pencils furnished by the proctor.
Be sure to answer all questions.

Each student was asked to sign his test paper. This was done so his scores could be given to his FNIA 2113 teacher to be used in evaluating the student.

The prerequisites for taking this test were: (1) the person must be an undergraduate student in college, (2) must not have taken FNIA 2113, Family Foods or it's equivalent while in college, and (3) be a female. The test was given to females only since male students usually do not take this subject.

The test was given to seventy students and will be given to at least 430 additional students at the beginning of the 1970 school year. This larger sampling will give a more accurate statistical analysis of the test.

Procedure for Test Analysis

After administration of the pretest the papers were hand-graded and given to the Oklahoma State University Computer Center for analysis. In the Computer Center, the papers were placed in order from least to greatest number of questions missed. The top 27 per cent and lowest 27 per cent of the papers were segregated and compared in order to determine the validity and reliability of the test.

Answers to each question were punched on computer cards.

An example of information contained on each card is as follows:

BARBOUR70L01 66 3122 1412 1344 1342 1411 4212 3112 2221
2141 2332 1344 3334 33

These cards were used to prepare an analysis of each question on the test. The completed analysis shows information regarding answers to each question. An example of the information shown is as follows:

ITEM NO. 1	ANSWER C			
	A	B	C	D
H	3	3	12	1
L	0	12	7	0

The answers were corrected for guessing by the use of a formula from Davis (8, p. 6)

$$P = \frac{W}{R - K - 1} \cdot N$$

where

- P = Proportion
- R = The number of testees that answer the item correctly
- W = The number of testees that answer the item incorrectly
- K = The number of choices in the item
- N = The number of testees answering the question

The results were used to find the coefficient of correlation in a table from Flanagan (10, p. 348). If an odd

rather than even correlation coefficient was obtained, interpolation was necessary. This is how the validity index was determined.

To get the discrimination index, the r-value was extrapolated from a table in Davis. (8, p. 13). The discrimination index of a question tells whether a question separates the upper-level students from the lower-level students. A discrimination value of less than .15 indicates that the question may need revision.

The difficulty index of each question was determined from the top and bottom 27 per cent (19) of the test questions. To get the difficulty index, the percentage of success must first be determined. To do this, total the high and low answers and divide by two (7). The resulting figure is used to find the difficulty index from a table by Davis. (8, p. 38) A difficulty index range between 25 and 70 is considered good and an index of 50 is considered the best.

All of the scores were used to determine the mean and standard deviation. The reliability was then computed using a formula from Garret. (11, p. 341):

$$r_{11} = \frac{nt^2 - m(n-m)}{t^2 (n-1)}$$

where

r_{11} = Reliability of the whole test
 n = Number of items in test
 t = Standard deviation of test scores
 m = Mean of test scores

A sample of the final output of the computer is as follows:

ITEM NO. 1	ANSWER C				TOTAL	PROPORTION
	A	B	C	D		
H	3	3	12	1	19	0.51
L	0	12	7	0	19	0.16

R 0.39 DIS. INDEX 25 DIF. INDEX 41

The information was also condensed into tables and ranked according to: (1) item number, (2) coefficient of reliability, (3) discrimination index, and (4) difficulty index.

CHAPTER IV

RESULTS AND DISCUSSIONS

Analysis of Pretest Scores

The test scores for the 70 students taking this pretest are presented in Table 1. This table is arranged in groups of five using percentage points. The mean of these scores is 54.03 percent; the standard deviation is 10.49. The reliability index, for a given test, will range from values of 0.00 to 1.00. The higher indices indicate higher consistency of results; a reliability index about 0.80 is considered to be quite good. The reliability of this test was determined to be 0.83.

Analysis of Test Items

To illustrate the distribution of the discrimination indices, Table 2 was prepared using the upper and lower 27 per cent of the test papers (38 of 70 students). Again, as in Table 1, the indices are arranged in groups of five ranging from 0 to 100 per cent. For a question to discriminate between students, it must have a relatively high percentage.

TABLE 1 Distribution of test scores* on a percentage basis for 70 students taking the food preparation laboratory pretest

Score Range	Frequency
95 - 100	0
90 - 94	0
85 - 89	0
80 - 84	0
75 - 79	0
70 - 74	6
65 - 69	4
60 - 64	13
55 - 59	12
50 - 54	12
45 - 49	8
40 - 44	10
35 - 39	3
30 - 34	1
25 - 29	1
20 - 24	0
15 - 19	0
10 - 14	0
5 - 9	0
0 - 4	0

*Each of the 50 questions was given a value of two points.

TABLE 2 Distribution of discrimination indices based upon the upper and lower 27 per cent of 50 questions in the food preparation laboratory pretest

Score Range*	Frequency
95 - 100	0
90 - 94	0
85 - 89	0
80 - 84	0
75 - 79	0
70 - 74	1
65 - 69	1
60 - 64	0
55 - 59	1
50 - 54	1
45 - 49	0
40 - 44	5
35 - 39	6
30 - 34	4
25 - 29	3
20 - 24	5
15 - 19	4
10 - 14	4
5 - 9	9
0 - 4	6

* Each of the 50 questions was given a value of two points.

That is, the higher the percentage, the better the question is. Indices below 15 are considered to be non-discriminating. As illustrated in Table 2, 19 questions fell below the discriminatory index of 15. Thus, while 62 per cent of the questions had an acceptable discrimination index, 38 per cent did not.

A further comparison of test questions was made utilizing the aid of a difficulty index. This distribution of difficulty indices is shown in Table 3. The acceptable range for the difficulty index is 25 - 70 per cent. The lower the percentage, the more difficult the question is and the higher the percentage, the easier the question. Analysis of this pretest indicates that 92 per cent of the questions met the acceptable criteria while 8 per cent did not.

TABLE 3 Distribution of difficulty indices based upon the upper and lower 27 per cent of 50 questions in the food preparation laboratory pretest

Score Range*	Frequency
95 - 100	1
90 - 94	0
85 - 89	1
80 - 84	0
75 - 79	0
70 - 74	0
65 - 69	2
60 - 64	4
55 - 59	6
50 - 54	5
45 - 49	11
40 - 44	4
35 - 39	10
30 - 34	3
25 - 29	1
20 - 24	2
15 - 19	0
10 - 14	0
5 - 9	0
0 - 4	0

* Each of the 50 questions was given a value of two points.

CHAPTER V

SUMMARY AND CONCLUSION

In this study an attempt was made to revise Steelman's (18) laboratory pretest. It was decided that before another laboratory test was made a new set of laboratory objectives and concepts were needed. After these were developed, a need for more generalizations became evident. Steelman's generalizations were good but more generalizations were needed. Due to the fact that different objectives and concepts were used and that this author's test was of a different type, Steelman's laboratory test was not used as a basis for this laboratory pretest.

The laboratory pretest was developed using multiple-choice questions and "graphic" laboratory situations. This test consisted of 50 questions which was administered initially to 70 undergraduate students. These students had taken no courses in food preparation while in college. This test was given in 50 minutes. It can be administered at one time to as many students as can see the graphic questions projected on a screen.

After the test was administered it was scored and taken

to the Oklahoma State University Computer Center for analysis. In the past, item-analysis had been done by hand. It is now possible for this process to be accomplished by the computer. This does not necessarily save time but it is more accurate. The remainder of the computations were accomplished by use of the computer as in the past. The results were that: (1) the reliability index was 0.92; (2) 62 per cent of the test questions fell above the acceptable level (15 per cent) of the discrimination index; and (3) 92 per cent of the test questions fell within the acceptable range (25-70 per cent) of the difficulty index.

Several things should be done to improve this test. One of these is to give the test to a larger number of subjects. In this study 70 students were used but 500 would be a more acceptable number. The discrimination index also needs improvement. This should not be undertaken, however, until this test has been administered to the full 500 students. It is felt that when the range of scores is increased the discrimination index will improve.

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APPENDIX

TABLE OF SPECIFICATIONS

OBJECTIVES	KNOW- LEDGE	COMPRE- HENSION	APPLI- CATION	ANALYSIS
I. Develop the ability to:				
1. Use proper etiquette in a meal time situation. 6%*			8%	
2. Make use of the principles of time and motion studies in everyday situations. 4%			2%	6%
3. Recognize standard qualities in prepared products. 15%		2%	10%	4%
4. Choose the most economical and best quality raw products for every-day situations. 6%			6%	
5. Store a variety of foods properly. 4%			4%	
6. Plan menus using acceptable combinations of food. 5%			4%	2%
II. Learn the recommended method for:				
1. Using electrical and gas equipment. 3%			2%	
2. Using utensils in food preparation. 10%			8%	
3. Maintaining adequate safety and sanitation in the kitchen. 3%			2%	

TABLE OF SPECIFICATIONS (Continued)

OBJECTIVES	KNOW- LEDGE	COMPRE- HENSION	APPLI- CATION	ANALYSIS
III. Have a general knowledge of:				
1. Principles of food preparation	10%		6%	4%
2. A variety of uses of available food products.	6%	4%	2%	
3. Types of informal table service and their uses.	3%		2%	
4. Roles of federal and state agencies in protection of our food supply.	3%	2%	2%	
IV. Have specific knowledge of:				
1. Common terms used in food preparation.	10%		8%	
2. Table settings and their uses.	6%		4%	2%
3. Information needed when reading a recipe	6%	4%		

* Theoretical percentage

VITA

Betty Jean Stockton

Candidate for the Degree of

Master of Science

Thesis: DEVELOPMENT OF A GRAPHIC LABORATORY PRETEST FOR A
BEGINNING COLLEGE FOOD PREPARATION COURSE

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born 24 June 1946 in Biloxi, Mississippi. Daughter of Lloyd and Ruby Roberts. Married 9 September 1967 to Ben Joe Stockton.

Education: Graduated from Moore High School, Moore, Oklahoma in 1964; attended Central State College, Edmond, Oklahoma in 1964 and 1965; received Bachelor of Science Degree in Home Economics from Oklahoma State University in 1968; American Dietetic Association Approved Internship, Henry Ford Hospital, Detroit, Michigan, 1969; completed requirements for the Master of Science degree in Food, Nutrition and Institution Administration in May, 1972.

Personal Experience: Food Service Supervisor, Presbyterian Hospital, Oklahoma City, Oklahoma, Summer 1967; Graduate Teaching Assistant, January 1969 to January 1970.

Professional Organizations: American Dietetic Association; American Home Economics Association; Oklahoma Dietetic Association.

Typist: Mrs. Grace Provence