DEVELOPMENT OF AN OBJECTIVE WRITTEN AND LABORATORY PRETEST, BASED ON AIMS AND GENERALIZATIONS FOR A BEGINNING COLLEGE FOOD PREPARATION COURSE

By

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CHAPTER I

INTRODUCTION

Much has been done by educators to advance the capable and well-prepared student in the academic areas of study, but little has been done to accelerate qualified students in home economics. There is undoubtedly a definite need for a systematic evaluation of the competence of all beginning students in food and nutrition as a basis for placement. The facts that not all students are created equal and not all have had similar experiences constitute practical reasons for such a program. Any entering freshman class in home economics contains students who have had possibly six years of home economics in the junior and senior high schools, 4-H Club work, and differing degrees of experience in performing household duties. Students who have not had such a wide range of experiences in class often know much of the material that is being taught in the first food and nutrition course in college through home experiences. Along with the well-prepared students, are the ones who have had little, if any experience. Both types will include those who have a combination of varying degrees of the following characteristics: good study habits, eagerness to learn, adjustable personalities, and high intelligence.

Arny (1, p. 45) believes that if transfer students and freshmen could be placed in accordance with their level of proficiency upon

entrance, the following results could be anticipated:

1. More girls who looked forward to home economics as a profession would elect homemaking courses in the senior high school.

2. Fewer good students would drop out of the home economics curriculum in college.

3. There would be less difficulty in locating competent home economists for the leadership jobs developing in so many areas.

The author believes that a valid, reliable, discriminating, and objective pretest can be devised and administered to entering students in food and nutrition courses. Such a test will be difficult to construct because so much of the learning in this area involves the development of skills and techniques.

The validity of a test indicates the degree to which it measures what it is claimed to measure. The validity of a test can be determined by submitting the test items to a panel of experts for evaluation in relation to the content of the area to be tested.

The reliability indicates the accuracy with which a test measures whatever it is expected to measure. The reliability can be determined by an approximation formula.

The pretest will be based on goals compiled from those used in a beginning course in foods at Oklahoma State University and the goals for a beginning food course set up by the Southern Regional Conference of College Food and Nutrition Teachers. Generalizations, to be included in the subject matter covered by the test, will be compiled from recent textbooks, laboratory manuals, and bulletins.

The test will be constructed to determine the following elements of the students' knowledge and abilities:

1. Ability to apply principles of food preparation.
2. Recognition of accepted procedures in preparation and service of food.
3. Ability to do critical thinking and use judgement in relation to:
   a. Selection of food.
   b. Combinations of food.
   c. Selection of equipment.
   d. Recognition of standard products.
   e. Use of time, energy, and resources.
4. Attitudes toward food.

The author believes that a valid and reliable pretest can serve as a basis for the following purposes:

1. Exemption of students with high scores from the first course in food preparation.
2. Sectioning of the remaining students according to their level of achievement.
3. Indication of the prevalent strengths and weaknesses so that faculty members can plan for each group.
4. Aid in individual guidance.
5. Motivate students to add to present knowledge.

To adequately test the students' knowledge and abilities, a station-to-station laboratory pretest as well as a written objective pretest will be given. The station-to-station pretest will consist of moving from place to place in a room at which the subject will evaluate finished products, select equipment and identify methods of food preparation and service.

Each part of the pretest will be administered during one fifty-minute class period. The examination will be devised so that all scoring will be objective. The expense involved in administering the test

will be kept at a minimum.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The major purpose of education is to change the behavior patterns of people. Evaluation is a system of measuring the degree that these changes have occurred. Measurement, a means of obtaining quantitative evidence concerning growth or changes in behavior, is an important phase of evaluation, but it is not the entire process. Evaluation should also consider value standards and the goals which a group is trying to obtain.

Need for Objectives in Education

Arny (1, p. 13) stated the following in 1953:

> Slowly but surely, there is emerging a realization that both instruction and evaluation should be focused upon goals rather than upon content; upon the use people will make of subject matter than upon the subject matter itself.

Tyler (24, p. 40) who has worked considerably with the formulation and use of objectives believes that by defining these desired educational results as clearly as possible, the curriculum-maker has the most useful set of criteria for selecting content, for suggesting learning activities, for deciding on the kind of teaching procedures to follow, in fact to carry on all the further steps of curriculum planning. Objectives are the most critical criteria for guiding all the other activities of the

curriculum maker.

Tyler (24, p. 30) writes the following:

> The most useful form for stating objectives is to express them in terms which identify both the kind of behavior to be developed in the student and the content or area of life in which this behavior is to operate.

Tyler recommends that a graphic two-dimensional chart be used to express objectives concisely and clearly. One dimension is the content aspect and the other dimension is the behavioral aspect.

Tyler believes that to identify appropriate learning experiences it is helpful to differentiate rather clearly types of behavior which are quite different in their characteristics. According to this author seven to 15 categories of behavioral objectives are desirable.

Tyler (24, p. 38) also writes:

> It is desirable to have a sufficient number of content categories to differentiate the important from the less important content. One function of the sub-headings is to indicate areas of content that are important and appropriate and others that are not. A second purpose is to put together areas that are reasonably homogeneous areas for sampling content specifics rather than to use areas which are heterogeneous and include quite different kinds of content.

He recommends ten to thirty content areas as being useful.

Tyler (24, p. 36) further states, "The chart may also suggest some possible gaps in objectives that can be examined and screened by the same criteria as are used for the original set of objectives".

Remmers and Gage (18, p. 28) write:

> ...the first and last steps in educational evaluation should be respectively, the formulation of objectives and the validation of the evaluating instrument against the objectives...Each objective must be clearly defined in terms of the measures of its attainment. The attainment of a particular objective cannot be inferred from the measured attainment of another objective.

The rules of these authors (18, p. 33) for formulating objectives are as follows:

1. Objectives should be worded in changes expected in the pupil rather than as duties of the teacher.
2. An objective should be put in terms of observable changes in the pupil between the beginning and end of his experiences in a defined segment of the educative process.
3. The terminology of the objective should be understandable; it should have its meaning defined in terms that pupils, parents, and other teachers can appreciate.
4. Each statement should be unitary and contain one objective only, to prevent confusion and facilitate ready indentification of the objective.
5. Specific objectives should be grouped under the objective that is general for them.

Lehman (15, p. 38) further supports the theory that evaluation must be based on objectives. She writes, "Any examination of a department--whether this is carried on by the faculty or by an outside agency--must be based on the objectives which the department considers important. Lehman also believes that students are not a statistic, although a survey sometimes seems to make them so. They are human beings, with individual purposes, ambitions, and problems of which faculty may often be unaware. They bring to college differing degrees of ability and sometimes definite handicaps. Students are individuals and the teacher does better work if he knows them as such.

Need for Generalizations in Home Economics Education

Home economics educators are increasingly becoming aware of the importance of principles and generalizations in education. The food test developed in this study is based on generalizations for a beginning food preparation course.

Williamson and Lyle (26, p. 274) write:

> Since every situation a pupil meets in life will be different in some respects from every other, we cannot hope to educate them to meet each new experience unless we help them to recognize the principles or generalizations that can guide them. Ability to generalize is a difficult aspect of thinking...If there is to be a transfer of learning, principles and generalizations must be thoroughly understood.

Barbour (2, p. 50) has defined generalizing as the process of identifying the common aspects in different situations and showing the relationships between them.

Pattison, Barbour, and Eppright (17, p. 41) have defined generalizations as specifics of broad application supported by facts. They show relationships among ideas that belong together, and are designed to encourage thinking on the part of students.

The preceding authors have developed and published a set of generalizations for teaching nutrition, but no such set has been published for food preparation at any level of understanding.

The following criteria are given by Barbour (2, p. 102) as points to consider in the statement of generalizations in nutrition:

1. Generalizations in nutrition must be based upon reliable experimental evidence.
2. Evidence is acceptable only when the experiment is carefully controlled and subsequently reaffirmed by other investigators.
3. If the results of experiments indicate, but do not clearly establish, the validity of a finding the statement of the generalization should be qualified by such terms as "may be", "has been shown", and "there is some evidence".
4. Contradictory results in experimental evidence necessitate the exclusion of some generalizations.
5. Information derived from animal experiments cannot be applied to human beings without qualification.
6. Choice of non-technical words which convey valid nutrition ideas requires caution and discrimination.

7. In nutrition broad statements often exclude details necessary for useful application.
8. Many statements concerning nutrition which appear in textbooks, periodicals, bulletins and other literature are not based on valid experimental evidence.

Barbour (2, p. 51) also writes, "Generalizations need to be simply stated and unaccompanied by irrelevant details if their meaning is to be obvious and complete."

In order to show relationships, Barbour has suggested beginning generalizations with either "if", "because", or "when".

Need for Pretests in Home Economics

Many educators have recognized a need for pretests at the college level. Remmers and Gage (18, p. 552) state:

> Pretests may be used to discover the achievement of instructional objectives which pupils already possess as a result of previous school and out-of-school experiences. The results of these tests can be used to plan the relative emphasis in instruction and, perhaps to show when certain parts of the course may be omitted. When well constructed, pretests may also serve as stimulators of interest in the materials to be studied. Such a test may indicate to pupils the kind of achievement to acquire from the instruction they receive; if the test has been interestingly written, they may learn for themselves the areas in which they are strong and weak and distribute their learning efforts accordingly.

Hoskins (10, p. 2) writes that a valid pretest could accomplish the following:

A. Permit those students who rated high on the test to enroll in a more advanced course.
B. Allow more favorable placement of transfer students.
C. Enable students to better realize their strengths and weaknesses and thus increase interest in the course.
D. Assist the instructor in grouping students according to their experience and needs.
E. Aid in individual guidance.
F. Aid in planning curriculum revision.

Wansgard (25) developed a food laboratory pretest for use at Cornell University in 1958. She believes that many types of exper-

iences, such as home, school, and 4-H Club, will have influenced the student's level of understanding and skill. According to her study the number of years experience the student has had with these groups does not however, provide information as to the quality or breadth of the experience, nor does it indicate how much each individual learned from the situation. She also believes that a valid estimate of the experience of each student cannot be obtained by having the student state her competency in food preparation since this is a valued judgement. Wansgard supports the theory that the most accurate way to obtain an estimate of the effect of past food preparation experience on the student would be to measure the knowledge, understanding and skill retained. To measure a student's understanding and ability is difficult in those areas where both subject matter knowledge and manual skills are involved. Food preparation is one of those complicated areas.

Wansgard (25, p. 39) believes that the results of a food pretest could be used in one or more of the following ways:

1. To evaluate the course content and to select areas which need special emphasis.
2. To differentiate between the students with various levels of achievement in food preparation.
3. To serve as a basis for exempting students from the course as a whole or certain specific parts.
4. To help the student evaluate her own level of achievement and thus motivate her desire to learn.
5. To measure the student's progress and level of achievement at the end of the term.

The Committee on Measurement and Evaluation of the American Council on Education (3, p. 26) in 1959 reported that pretests can be of great use in ascertaining the assumption that there exists a certain initial background on the part of students entering a course of instruction. The committee also stated that it is very difficult

to bridge the gaps in learning that occur with students whose abilities, preparation for a course, and interests vary greatly. Many institutions have adopted a policy of placing students in course sections representing different degrees of attainment so that instruction may proceed at the level appropriate to the capacity of readiness of the group.

Arny (1, p. 44) believes that there is undoubtedly a definite need for a systematic evaluation of the competence of all entering students as a basis for placement within the curriculum of their choice. Unless the present status of the students is known, neither students nor teachers can see what changes need to be made or are able to plan what instructions should be given to bring about such changes. Tests planned for diagnostic purposes may provide information regarding specific gaps in knowledge, misconceptions held, fallacies in thinking; or the lack of aesthetic appreciation or skill in performing certain tasks. Unfortunately such tests are difficult to construct.

Arny (1, p. 28) states:

> Not only should the teacher find out what students know and can do, but the students must make the discovery also if optimum progress is to be anticipated. When students discover their own deficiencies they are likely to work harder to correct them than when someone else points them out.

Home Economics Pretesting in Various Institutions

Several home economics pretests have been developed for use in individual colleges and universities during recent years. Clothing and food areas use pretests more often for placement than do the other areas in home economics.

No published pretest is known that effectively measures a student's knowledge and abilities in the area of food preparation, though.

Hoskins (10) constructed a clothing pretest for use in the New Mexico state colleges and universities in 1959. A questionnaire listing basic learnings for the first clothing course was sent to colleges participating in the study requesting an indication as to the amount of emphasis each learning received in that institution. She also asked for information regarding the texts used and what previous use had been made of clothing tests. Generalizations were formulated from an analysis of the questionnaires returned by the colleges. The generalizations were used as a basis for selecting individual test items for each area. Data was obtained by administering the completed pretest to high school seniors in several schools. A questionnaire regarding their past experience in clothing construction was also answered by the students. Little correlation was found in their test scores and in the amount of experience that they listed.

Witt carried out a more extensive study in clothing pretesting at Oklahoma State University in 1960. Evaluation devices were revised and developed to appraise clothing competencies of freshmen. The competencies she tested could easily be adapted to the area of foods. The competencies listed by Witt (27, p. 1) are given below:

1. Student's knowledge of the selection, construction, and care of clothing.
2. Student's ability to apply principles.
3. Student's level of achievement in using manipulative skills.
4. Student's level of achievement in using judgmental skills.

Individual items and problems were based on secondary clothing programs and beginning college courses. Her (27, p. 2) problem was further divided into these five subproblems:

1. Development of a questionnaire-check list to obtain information pertaining to the student's previous clothing experiences.
2. The identification of common objectives of the secondary and beginning clothing experiences.
3. Examination of available tests.
4. The development of an evaluation device to determine the student's ability to solve problems related to clothing.
5. The development of a station-to-station test to evaluate the students manipulative and judgmental skills pertaining to clothing construction, selection, and care.

The station-to-station test used by Witt was developed after a personal interview with Dr. Grace Steininger from Cornell University. The original station-to-station test was developed for use in the food preparation area at Cornell by Wansgard (26). Her aim was to develop an instrument which would effectively measure a student's understanding of a variety of processes involved in food preparation and the students' abilities to carry out these processes. She proceeded on the theory that specific procedures are crucial in determining the quality of many products and that if these portions of the preparation could be selected, the student's abilities and understandings could be measured in a much shorter time and more effectively than if each product had to be prepared completely by the student.

Through personal correspondence, Miss Edna P. Amidon, Director of Home Economics in the Office of Education in Washington, D.C., indicated to the author that the following universities were in various stages of pretest development for food preparation courses: (1) Cornell University; (2) University of Illinois; (3) Iowa State University; (4) Ohio State University; (5) Purdue University, and (6) University of Tennessee.

A letter of inquiry with an attached questionnaire regarding their testing program in food courses was sent to each of these schools.

Dr. Grace Steininger, Professor of Food and Nutrition at Cornell University replied to a letter of inquiry concerning their testing program. She wrote that a laboratory pretest had been used with their beginning course for five years. They have made many changes in Wansgard's original test, but it is the basis for the test that they are presently using. The laboratory is set up in stations and at each station the student is given directions as to what she is to do. For instance, at one station she is to thicken a cup of hot liquid with flour. At another station she is given a pan with some raw potatoes in it and asked to measure the amount of water that she would use to cook them to preserve the maximum of Vitamin C. The student is allowed either five or ten minutes at each station. Half of the students take the practical laboratory test while the other half take the written nutrition pretest.

Mrs. Pearl Jansen, Head, Department of Food and Nutrition at the University of Illinois wrote that they have used a foods pretest with their core course for three years. Only one student has passed

both the laboratory pretest and the written examination that is given with it. A major purpose of their testing program is to make the student aware of how little he knows about foods.

No laboratory pretest is given at Iowa State University according to Dr. Wilma Brewer, Head, Department of Food and Nutrition. They do give an examination that makes it possible for a student to "test out" of a non-laboratory course in food and nutrition.

A proficiency test may be taken by qualified students at Ohio State University. If he passes this examination, he earns full credit in the course toward graduation, but it is not considered in the determination of cumulative point hour ratio. Dr. Eloise Green, Associate Professor of Home Economics, who is responsible for making up the test, wrote the author that a student is permitted to schedule the practical part of the test if he passes the written test with a grade of B or better. The students are given a menu of five or six items to prepare in a three-hour block without looking up any recipes or other information. Several students have passed both sections of the test and have gone directly into the succeeding course of Meal Management.

Dr. Margy Woodburn, Associate Professor of Food and Nutrition, wrote that a 100 per cent objective test is given to freshmen in the spring for placement in the fall at Purdue University. Their beginning foods course is offered at the sophomore level. An experience inventory is also used with the objective test.

Use of the Multiple-Choice Question

The author believes that the advantages of the multiple-choice question outweigh the disadvantages on a standardized test.

Travers (23, p. 179) writes:

> ...the merits of the multiple-choice type of test question are so extensive in comparison with other types of items. ...The essential structure of a multiple-choice question consists of a problem and a number of suggested solutions, of which one is usually correct. The first part--that is, the problem--is sometimes called the lead, or stem. The suggested solutions are sometimes called the alternatives, and the incorrect alternatives are called the decoys, or distractors. The test question as a whole is referred to as an item.

Nunnally (16, p. 153) points out the advantage of the multiple-choice question over essay questions:

> The essay question is comparatively easy to construct but difficult to grade with more than a dozen students. An adequate multiple-choice examination is much more difficult to construct but it can be graded easily with hundreds of students. ...The multiple-choice test is usually more reliable, and substantially more so, than the essay test. The unreliability of the essay examination comes from two main sources: from test scoring and from the sampling of content. ...The criticisms of multiple-choice examinations usually concern how bad they can be when improperly constructed and ignore the extent to which important materials can be framed in multiple-choice form by the ingenious test constructor.

Wood (28, p. 26) further supports the multiple-choice question:

> One of the basic characteristics of a multiple-choice item is that the item itself contains the standard by means of which the best answer is to be selected. One further advantage of the multiple-choice form arises from the fact that the best answer does not have to be the one and only indisputably correct response to the question posed. It must however be defensible as the best among the alternatives presented.

Remmers and Gage (18, p. 94) give the advantages and disadvantages of this method of testing:

> (1) The multiple-choice item can be adapted to testing the higher mental processes, such as inferential reasoning and fine discrimination, as well as the rote memorization of isolated facts. It is the flexible kind of test item available for varying types of mental processes according to a specific kind of subject matter. (2) The multiple-choice item is frequently preferable to the simple question when the correct response is lengthy or involved or can be written in several forms. (3) In proportion as the number of alternatives is greater than two, the possibility of guessing the correct answer is less than in the true-false test;

> the greater the number and plausibility of these alternatives, the less chance there is for a guessed answer to be correct. (4) Finally, multiple-choice tests tend to be free of response sets which, as previously said, may seriously dilute with irrelevant factors what is measured by constant alternative tests.
>
> Disadvantages of the multiple-choice test item are: (1) It is much more difficult to construct well than are other forms of test items. ...(2) Multiple-choice items require more time per item than do some other types.

Remmers and Gage (18, p. 95) give the following suggestions for constructing a multiple-choice examination:

1. The stem may be in the form either of a direct question or of an incomplete statement.
2. If an incomplete statement is used it should be meaningful in itself and imply a direct question.
3. The distractors should be plausible, so that pupils who do not possess the achievement being evaluated will tend to select them rather than the correct answer.
4. The length of the alternatives should not vary systematically with their correctness.
5. The arrangement of alternatives should be uniform throughout the test. One under the other is the best arrangement.
6. Grammatical consistency should be maintained throughout the item.
7. The number of alternatives should be four or five. There should be the same number for every item if a formula to correct for chance guessing is applied to the score.
8. There should be homogeneity in the alternatives.
9. Distractors can often be made attractive and plausible by expressing them in textbook phraseology.

No item should be so easy that 100 per cent of the students succeed with it, nor should any be so difficult that no one succeeds according to Remmers and Gage. The average score should be about half the possible score and the range of scores for the group will tend to range from almost zero to perfect.

Criteria for Constructing Laboratory Tests

Arny (1, p. 207) lists the decisions that she feels must be made in planning a practical foods examination as follows:

1. How many students would be tested at one time.
2. Whether they would work individually or in groups.
3. Whether all would prepare the same or different foods.
4. What foods they would prepare and what amounts.
5. What cookery skills the preparation would involve.
6. Whether students should be notified about the test in advance.
7. Whether they should be allowed to use recipes.
8. Whether they would serve the food after they prepare it.
9. What supplies should be on hand the day of the test.
10. What directions should be given.
11. How performance would be rated.
12. Who would do the rating.

The main steps used by Witt (27, p. 111) in developing a station-to-station test are listed below:

1. Selecting objectives to be evaluated.
2. Defining these objectives in terms of students' competencies.
3. Selecting problems exemplifying the objectives.
4. Preparing materials to be used at each station.
5. Working out details of administering the test.
6. Developing a means of scoring responses.

She (27, p. 111) developed the following criteria for use in selecting the problems for the test:

1. Problems include situations which are supplementary to the written placement test.
2. Problems are drawn from generalizations which cover the content area.
3. Problems are meaningful in terms of students own experiences.
4. Problems are specifically worded for this particular test.

Items which were used for testing by Wangsgard (25, p. 12) were selected on the following basis:

1. Phrases, words, and procedures frequently used in recipes.
2. The content of the course for which the test was being developed.
3. The judgment of persons trained and experienced in teaching food preparation.
4. The items which could not be tested by a written examination.
5. The practicality of testing in the laboratory.

Desirable Characteristics of Evaluation Instruments

No matter what form in which the test is given, there are certain characteristics which are desired in all evaluation instruments. Validity which indicates the degree to which a test measures what it is claimed to measure is one such characteristic. According to Arny (1, p. 88) the following factors reduce validity:

1. Directions are complicated or ambiguous.
2. Many different forms of test items are included.
3. Phrasing of the items is very complex.
4. Difficult computations are required.
5. Test is too long for time allowed.

Validity is more important than reliability, but reliability is very desirable. This characteristic indicates the accuracy with which a test measures whatever it does measure, and it is expressed in the terms of the coefficient of reliability. The factors associated with high reliability are listed by Arny (1, p. 99) as follows:

1. Adequacy of sampling of content-test is long in terms of items which can be scored individually. It covers all aspects of the course.
2. Scope of content-limited to one or more closely related areas. Samples important aspects but also includes material which has not been emphasized.
3. Types and quality of test items-not more than three types used. These represent the more reliable types. It should be clearly phrased in words students understand.
4. Difficulty and organization-majority of items of average difficulty--easy items at beginning; more difficult ones later.
5. Directions-adequate but not wordy; clearly stated.
6. Objectivity-can be scored with inflexible key.
7. Legibility-easily read.
8. Discrimination-the test produces a wide range of scores. All items discriminate between high-achieving and low-achieving students.
9. Range of ability of group tested-group heterogeneous. Same test given in successive grades.
10. Motivation of students-students work seriously and do best work.
11. Environmental conditions-quiet; no distractions.
12. Time allowance-rigid time limit. Many students do not complete test.

The typical item analysis of a test yields two kinds of information. It provides an index of item difficulty and an index of item validity. The difficulty on an item may be defined as the proportion of a sample of testees that answers the item correctly. The index of validity may mean how well the item measures or discriminates in agreement with the rest of the test or how well it predicts some external criterion.

Kelley (14, p. 17) has contended that the ratio of the obtained differences to its standard error is a maximum when the top group and the bottom group each include approximately 27 per cent of the total population tested. The comparison of the performance of these two groups furnishes the optimum point for making the most precise estimates of the discrimination values of items in the pool. Using a larger or smaller value than 27 per cent results in a loss of accuracy with which the items can be ranked from most to least discriminating.

Flannagan (6, p. 674) prepared a table based on the assumption that the variables underlying both item success and test score have a continuous normal distribution. The correlation coefficients supplied by Flanagan are estimates of the product-moment correlation between the two underlying continuous normally distributed variables.

Davis (4) and others have noted that one limitation in the use of any correlation coefficient as a measure of degree of relationship between two variables is the fact that units on a scale of correlation values do not have the same significance as one goes from small to large coefficients. Davis has proceeded to prepare an item index based on Fisher's z-transformation (5, p. 203) which is a linear function of the hyperbolic arc tangent of the product-moment r. This statistic can

be used as a direct measure of the amount of discriminating power possessed by an individual item and may be considered comparable from item to item. An increase in the value of z has a constant meaning at any part of the range of values. An item with a validity coefficient of .32 will have a discrimination index of 20. Items having discrimination indices of 20 or above ordinarily have sufficient discrimination power to be retained according to Davis (4, p. 15). Davis (4, p. 21) writes:

> It would be inefficient merely to select the items having the highest discrimination indices without regard to other factors, such as the weighting of each topic to be tested and the difficulty indices of the items, for if maximum efficiency of measurement is to be attained, the distribution of difficulty indices has to be controlled quite closely...all of the items used in the test should, ideally, be of a difficulty level such that half of the testees at the level of ability represented by the line of demarcation know the correct answer.

A test must be reasonably objective to be fair. Objectivity means that a test can be scored with an inflexeble key, or that a rating device will produce similar scores when used by different judges in rating the same products or observing the same behavior. It can be determined by correlating the pairs of simultaneous independent ratings given by different judges on the same products of behavior according to Arny (1, p. 108).

The accuracy and rapidity of scoring papers and computing scores on a test or other device are very important.

CHAPTER III

METHOD OF PROCEDURE

Introduction

The five individual, but correlated subproblems included in this study are; (1) the development of objectives for a beginning food preparation course; (2) the development of a set of generalizations to be used as a basis for the formulation of test items; (3) the construction of a food theory pretest, (4) the construction of a food laboratory pretest, and (5) the analysis of the test data. This chapter is concerned with the methods used for solving these problems.

Development of Objectives

A set of objectives for a beginning food preparation course was developed by the author since the Department of Food, Nutrition and Institution Administration at Oklahoma State University was in the process of revising their curriculum and no such set had yet been devised for the new beginning food preparation course. Objectives for other food courses at Oklahoma State University and the goals for beginning foods courses set up by the Southern Regional Conference of Food and Nutrition Teachers in Colleges were available for the study by the author. Objectives for the entire Division of Home

Economics at Oklahoma State University were also considered in the development of the goals for the beginning food courses. The outline which was developed by the Food, Nutrition and Institution Administration Faculty for the new course titled Family Food was used as a guide in developing the objectives.

A set of objectives were developed for a beginning food preparation course by the author and were evaluated by Dr. June Cozine, Head, Department of Home Economics Education; Miss JoAnna Chapman, Associate Professor of Home Economics Education; Miss Gertrude McAllister, Assistant Professor of Home Management, and Mrs. Gladys Marshall, Chairman, Basic Curriculum for Home Economics Freshmen. The following members of the Food, Nutrition and Institution Administration Faculty also evaluated the objectives: Miss Mary Leidigh, Miss Mary Beth Carter, Miss Eileen Matthews, Miss Hazel Baker, and Mrs. Louise Wakelee. The people outside the Food, Nutrition and Institution Administration Department who were asked to evaluate the objectives either have a degree in Food and Nutrition or Home Economics Education and have done extensive work in their areas. They were asked to evaluate the objectives on the basis of application for all majors in home economics.

Each of the people listed above rated the objectives according to their importance at the beginning level of food preparation. Upon a suggestion from Dr. Cozine, the author prepared a content and behavioral aspect chart as described by Tyler (24, p. 31). The chart, constructed by the author, is presented in the Appendix.

Definitions for terms used in the behavioral aspects of the goals were formulated by the author for this study because these words

often have different meanings in different situations. These definitions are given below:

Critical thinking is the process of formulating generalizations from a collection of specific facts and the ability to apply these generalizations to new situations.

Directs self is accepting responsibility for one's own individual and collective actions.

Attitude is a mental or habitual reaction to an object or idea as revealed by opinion or conduct relating to an opinion.

Appreciates is a sufficient understanding of an object or idea to permit acceptance of its significance or the pleasure which it produces.

Values are generalized circumstances of living which an individual consciously or unconsciously believes to have an effect on his well-being or self realization, either to himself, or to those with whom he is concerned.

The Food, Nutrition, and Institution Administration faculty members evaluated the objectives on the chart. The goals were then rewritten in statement form following the suggestions given by Remmers and Gage (18, p. 33) and presented to them for a final evaluation.

The developed set of objectives are presented in the results.

Development of Generalizations

The author applied Barbour's (2, p. 102) suggestions for formulating generalizations in nutrition to the formulation of food preparation generalizations for this study. A set of generalizations was developed from statements in recent textbooks (7, 11, 12, 19, and 22) and bul-

letins (20 and 21). The generalizations were arranged according to the area of food preparation to which they applied.

Four members of the Food, Nutrition and Institution Administration Department faculty at Oklahoma State University who teach the beginning food preparation courses evaluated the generalizations on the basis of reliability, level, and importance. The author either revised or deleted any statements which were judged as being at too high a level or unimportant by more than one of the faculty members. However, consideration was given to individual ratings. Statements which were rated as being unreliable by any faculty member were substantiated by at least two current references or were eliminated. The author endeavored to omit material that recent source materials disagreed upon before the generalizations were submitted for faculty evaluation.

The compiled set of generalizations are included in the section on results.

Development of Written Section of the Test

A decision to use all multiple-choice questions on the written pretest was made on the basis of the beliefs of many educators (16, 18, 23, and 28). A set of criteria for constructing multiple-choice questions was compiled by the author using suggestions from several previous workers (8, 18, and 28). The criteria used in this study 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. Irrevelevant inaccuracies should be avoided.

20. Unusual vocabulary should be avoided.

Four distractors per test item were used because generally when four or five distractors are used the reliability of a test is higher than if only two or three possible answers are used. The same number of distractors were used for each item so a correction for guessing formula could be applied to the test data (18, p. 95).

The questions were formulated from the generalizations developed by the author. Other source materials were used for items asking for isolated factual information such as measurements and temperatures.

Each question was written on a 3" x 5" card so that it could be arranged and rewritten easily. The test items were arranged according to area content and a chart was developed to show the distribution of the test items.

The questions were then typed on regular size typing paper and presented to Dr. Helen Barbour and Dr. June Cozine for evaluation. Some of the questions were deleted or revised and additional questions were added in the areas that they indicated as weak.

A total of 100 questions for the written section of the pretest was selected. The author received guidance in writing the directions for the test from Dr. Harry Brobst, Head, The Bureau of Testing and Measurements, Oklahoma State University.

The test was mimeographed on letter size paper with two columns per page. The alternatives were placed at random in a straight line under the stems of the test items. A cover page was used to prevent the students from reading ahead before they were told to begin. The title and the general directions for the test were placed on the cover page. The pages were held together by a single staple in the upper-left corner.

The test was administered to 60 students who had almost completed a beginning course in food and nutrition. However, they were not enrolled in the new course for which the test was designed. Twenty-six students who had had no previous experience in a college food preparation course, but were enrolled in the new course titled Family Food, took the test on the first or second day they attended class. Fifty-two other students enrolled in other basic food courses also took the test during the first week of the second semester to make a total of 138 students.

Each group took the test under similar physical conditions. The author attempted to adjust the temperature, lighting and outside noise to make the conditions as pleasant as possible.

The students were told the purpose that the test could serve in the future and the importance of doing their best work was emphasized. They were asked to answer all questions, even if they had to guess, so that each question could be analyzed for its validity. No time limit was placed on the test because each student needed to answer each question for the item analysis. However, they were asked not to spend too much time on any one item. A fifty-minute period was tentatively allowed for the test. The first 60 students taking the test were requested by the test administrator to encircle the number of the item they were working on at the end of each five minutes. By counting the number of circles on a test and multiplying by five it was possible to determine the approximate time required to complete the test.

Separate answer sheets and special pencils were used by the students so that the tests could be machine graded. Specific instructions were given to the students as to the use of these items. No student was

allowed to leave the room until the end of the fifty-minute period.

Development of Laboratory Section of Test

Objectivity, validity, and reliability are the main goals desired by the author in the development of the laboratory pretest. No information was found in relation to an objective food laboratory pretest that was being administered in any college or university. Therefore, no criteria were found for developing such a test.

The following set of criteria was developed by the author to be used as a guide in making the laboratory section of the test in this study:

1. The test should be objective.
2. The test should be based on pertinent 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 short enough to be administered in fifty 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 or take down.
7. The test should be one that can be administered by persons untrained in testing procedures.

One problem encountered in laboratory tests is that they are normally performance tests and therefore subjective. Two graders might give entirely different scores to one person's performance. The author could think of no way to make a conventional laboratory test that would have all the characteristics set up in the criteria. Therefore, it was decided to adjust a familiar system of objective testing--the multiple-choice test item--to an unfamiliar situation, the food laboratory.

Multiple-choice test items were developed so that four numbered alternatives to written questions or problems could be placed on the tables and counters in the laboratory in the form of foods, equipment, or photographs of procedures instead of being written on the test sheet. For example: a problem involving the selection of a piece of equipment for a particular process was presented on the test sheet. The alternatives were four numbered pieces of equipment which were placed on the counter near a number corresponding to the number of the test item. The student selected the piece of equipment he thought was most suitable and filled in the blank under the corresponding number on the special answer sheet furnished to him.

The alternatives were arranged consecutively, and clockwise, around the laboratory so that a student was automatically in position for the succeeding question as he finished the previous one.

Forty-four questions or problems were selected for the laboratory examination. These included equipment selection for specific jobs, identification of standard products, selection of food items for specific meal occasions, and recognition of errors in a place setting. The 44 problems and questions were divided into six groupings referred to as stations. An equal number of problems were not presented at each station. Some of the items required less time than others, therefore more of these were included at a station than were the more time consuming items. Six students could take the test (at one set of stations) at the same time with only one student at a given station. Two to four sets of six stations per set were used depending upon the number of students being tested.

The test booklet contained six pages of questions. Each page contained the problems for one of the six stations. The pages were arranged so that every sixth test booklet started with station six and each of the five booklets in between these two started with a different station number of either one, two, three, four, or five. The tests were handed out so that no two students would be at the same station at the beginning or at any other time during the test since the pages were arranged in the order of the sequence of the stations. For example: a student beginning at Station Six would rotate to Station One, and so on until he had finished Station Five.

Dr. Brobst guided the author in the formulation of the written and oral directions for administering the test. He also helped the author arrange the format for the test booklet. The directions used in administering the test are given in the section on results.

A cover page giving general directions for taking the test and the title of the test was used.

Thirty-seven of the first sixty students who took the written pretest were also given the laboratory test. Four sets of six stations each were set up because twenty of the students were in one section and seventeen were in the other section. The 78 students who took the test at the beginning of the second semester were allowed one two-hour period to complete both the written and laboratory tests. Each section of approximately twenty students were divided into two groups. While one group took the written test, the other group took the laboratory section of the test. At the end of one hour the groups exchanged positions. Only two sets of six stations each were needed for this

since eight to twelve students were in the laboratory at one time.

Directions for taking the written test were given before the student groups were divided. They were also given general directions for taking the laboratory test at this time. However, specific directions were given to each group in the laboratory just before they started this test.

A six-minute time limit was tentatively set for each station. At the end of six minutes, or when it was evident that all students had finished their station, the students were asked to rotate to the next station. Instructions asking the student to please remain at his station until he was requested to change were in capital letters at the bottom of each test page.

One easily recognizable criticism of this type of testing is that a student's actual skill cannot be evaluated. However, the author believes that skills cannot be developed in the classroom laboratory. Students can learn methods and procedures for developing skills, but if they do not practice these outside the laboratory, they will not be skilled when they complete one course in food preparation. Because of this, the author believes 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.

Procedure of Test Analysis

The reliability coefficients for both instruments were determined by the following approximation formula (9, p. 341) which gives the

minimum reliability estimate to be expected:

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

r_{11} = reliability of the whole test,
n = number of items in test,
σ_t = standard deviation of test scores,
m = mean of test scores.

The assessment in each case demands utilizing the number of items in the test, the standard deviation and the mean of the test scores. The estimate in each case gives the reliability of the whole test.

The most common use of item-analysis data is in the selection of best items to make up the final form of the test. After the Food Theory and Laboratory Pretest had been administered the difficulty indices and discrimination indices were assessed to determine which items were to be included in the test, which items should be re-edited and which items had little or no discriminating value. Only those test papers were analyzed in which all items were answered.

The analysis, applied to each test separately, consisted of comparing the performances of testees in the upper 27 per cent of the total group on each item with the testees in the lower 27 per cent of the total group.

In the analysis involving the Food Theory Pretest a total of 37 subjects was included in the upper 27 per cent and a total of 37 subjects were included in the lower 27 per cent. In the Food Laboratory Pretest analysis a total of 31 subjects was included in each of the two groups.

In order to get a clear picture of the procedure of analysis, each item in the upper and lower 27 per cent of the total distribution of test scores was treated as follows: (1) the number of distractor responses and right answer responses were counted; (2) the number of

right responses was corrected for guessing and converted into a proportion using the formula given below: (4, p.6)

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

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.

(3) the validity index was obtained by reading from Flanagan's Table (6, p. 674) with the proportions passing the item in the upper and lower 27 per cent and locating the appropriate correlation coefficient; if odd rather than even proportions were obtained, an interpolation for the appropriate correlation coefficient was required; (4) the validity index was converted into a discrimination index by reading from the Discrimination Indices Table prepared by Davis (4); (5) the level of item difficulty was determined by summing the proportions derived in step (2) and dividing by two, and (6) the average proportion derived in step (5) was converted into a difficulty index number by referring to the Difficulty Indices Table prepared by Davis (4, p. 38).

CHAPTER IV

RESULTS AND DISCUSSION

Objectives Developed

The student objectives that were developed by the author for the beginning food preparation course are as follows:

Objectives for FNIA 213 Family Food

I. Does critical thinking in relation to:
   1. Food purchasing, storage, preparation, and service.
   2. Desirable standards of prepared food.
   3. Management of time, energy, and other resources in food purchasing, storage, preparation, and service.
   4. Evaluation and acceptance of new foods.
   5. Sanitary practices in handling and preparing food.
   6. Food selection, preparation, and service as a means of creative expression.
   7. Desirable combinations of foods.
   8. Equipment needed in food preparation and service.
   9. Wide use of available foods.

II. Directs self in relation to:
   1. Food selection, preparation, and service as a means of creative expression.
   2. Use of terms in handling and preparing food.
   3. Sanitary practices in handling and preparing food.
   4. Management of time, energy, and other resources in food purchasing, storage, preparation, and service.
   5. Wide use of available foods.
   6. Selection of meals for self and others.
   7. Evaluation and acceptance of new foods.

III. Develops desirable attitudes in relation to:
   1. Contribution of processed foods to present-day living
   2. Combinations of foods.
   3. Psychological, economic, and social effects of food advertising in our society.

IV. Develops an appreciation of:
1. Contribution of processed foods to present-day living.
2. Variety of methods used in preparation and service of food.
3. Contribution of food and its service in fostering family relationships.
4. Information which appears on packaged products.
5. Contribution of current scientific knowledge of food processing and preparation.
6. Benefits which agencies provide the consumer.
7. Pleasures which may be found in eating.

V. Develops values in relation to:
1. Sanitary practices in handling and preparing food.
2. Food selection, preparation, and service as a means of creative expression.
3. Wide use of available foods.
4. Desirable standards of prepared food.
5. Management of time, energy, and other resources in food purchasing, storage, preparation, and service.

Generalizations Developed

The final set of generalizations as developed by the author for the beginning food preparation course are:

Generalizations for FNIA 213 Family Food

Meats

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 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 stage 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 molds 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 microorganisms, 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 exygen 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 surfaces.

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 food 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 vegetable 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 will 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 in an acid solution 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 $0^{o}F$.

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 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 readily 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 flaky.

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 could 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.

Theory Section of Pretest

The general directions printed on the cover sheet of the Theory Section of the Pretest are given below:

GENERAL DIRECTIONS: Do not turn this page until the examiner tells you to do so.

No questions may be asked after the examination has begun. Please answer all the questions, even if you have to guess. DO NOT SPEND TOO MUCH TIME ON ANY ONE ITEM.

The following set of specific directions was printed at the top of the first page of test items.

DIRECTIONS: Each of the following incomplete statements or questions is followed by four possible answers. Select the answer that <u>best</u> completes the statement or answers the question. On your answer sheet blacken with pencil the space between the dotted lines having the same number as your choice.

Additional oral instructions on the use of the special answer sheet and special pencils were also given to the students. There was no indication of any misunderstanding of directions by the students. A time limit of fifty minutes proved to be ample for the majority of the students. Several students finished the written section of the pretest in thirty minutes.

A sample of the type of question used on the theory section of the pretest is given below:

Egg yolk should not be in egg whites to be whipped because the
1. Iron interferes with whipping
2. Vitamin A interferes with whipping
3. Sugar interferes with whipping
4. Fat interferes with whipping

Five of the top 27 per cent of the students chose distractor (1) as the best answer, three chose (2), one chose alternative (3) and 28 chose the correct answer (4) giving a proportion of .68 answering the item correctly when a correction-for-guessing formula was applied to the data. Seventeen of the lower 27 per cent of the students chose alternative (1) as the answer, ten chose (2), one chose distractor (3), and nine selected the correct answer giving a proportion of .01 answering the item correctly. The discrimination index for this item is 67 and the difficulty index is 42. Both of the indices are highly acceptable according to Davis (4).

Laboratory Section of Pretest

The general directions printed on the cover of the Laboratory Pretest Booklet are as follows.

GENERAL DIRECTIONS: You will be required to answer questions which will be presented to you at each of six stations. You will be directed to the stations by the instructor. At each station you will be allowed approximately five minutes to make your responses on the separate answer sheet, using a special pencil. Please answer all of the questions at a given station in the time allotted by the instructor, even if you have to guess. At the end of each five minute period you will be asked to move to the next station.

Specific directions with an example were also printed at the top of every test page. The following set of specific directions is for Station Four.

> At Station IV you are to answer items 25 through 32 on your answer sheet. In responding to item 25 select the cut of meat which would be most suitable for roasting. Indicate your answer, for example, by marking between the dotted lines the best choice for item 25 and so on for the remaining items.

Specific directions were given on each page because the students started at different stations.

The following item is given as an example of the type of problem included in the Laboratory Section of the Pretest.

Which utensil is the most desirable in which to roast the meat? The possible alternatives were (1) a jelly roll pan, (2) a covered roaster, (3) a shallow open pan with a rack, and (4) a rectangular pyrex baking dish.

None of the top 27 per cent of the students chose (1) as an answer, three chose (2), 28 chose the correct answer, (3), and none of this group chose distractor (4). Twenty-three of the lower 27 per cent chose decoy (1), seven chose (2), only one chose the correct answer, and none of the lower 27 per cent group chose distractor (4). The proportion of good students answering the item correctly was .87, while only .01 of the students in the lower group answered the item correctly when a correction-for-guessing formula was used. This ratio gives a discrimination index of 80 and a difficulty index of 47. Both of these indices are highly acceptable as indicated by Davis (4).

The six-minute time allowance for each station proved to be more than ample for all the students. Dr. Brobst, who administered the laboratory section to about twenty of the students, and the author, who administered the tests to the remaining students, found that the testing time could be speeded up by asking the students to rotate when it was apparent that all the students had completed the items at their station. By doing this the laboratory section of the pretest was completed in

about thirty minutes.

The time required for setting up the laboratory test was thought to be too long to be practical by several of the faculty members who cooperated. The author used approximately three hours to set up the laboratory and to prepare the food items used in the test the second time it was given. Additional time was required to assemble the equipment and to clear the laboratory. A much longer time was required the first time the test was given.

The laboratory pretest was given to five different sections of students during the first week of the spring semester. One set of food products was used for the entire week. The food was wrapped in polyethylene and stored in the refrigerator between test periods. The cost of food used in the test was approximately three dollars, which is relatively inexpensive.

Approximately thirty linear feet of cabinet or table top space was required to set up a complete set of six stations.

Analysis of Pretest Scores

The distribution of scores for the 138 subjects who took the Theory Section of the Pretest is presented in Table 1, while the distribution of scores for the 115 students who took the Laboratory Section of the Pretest is given in Table 2. The mean of the scores for the theory section of the test was 44.40 and the standard deviation for the scores was 11.90. The reliability of the Theory Section of the Pretest was found to be .83. (9).

The mean for the laboratory section of the pretest was 22.02 and the standard deviation was 5.09. The reliability of this section of

Table 1. Distribution of Scores* for 138 Students Taking the Theory Section of the Pretest.

Score Range	Frequency
70-74	3
65-59	5
60-64	4
55-59	10
50-54	19
45-49	25
40-44	27
35-39	19
30-34	10
25-29	10
20-24	1
15-19	3
10-14	2

*Possible score of 100.

Table 2. Distribution of Scores* for 115 Students Taking the Laboratory Section of the Pretest.

Score Range	Frequency
35-39	2
30-34	6
25-29	32
20-24	37
15-19	26
10-14	10
5-9	1
0-4	1

*Possible score of 44.

the test was .59. The lower reliability of the laboratory section of the test was expected since the range of possible scores was narrow. (9).

Analysis of Test Items

The distributions of discrimination indices for the two sections of the pretest are presented in Table 3.

Table 3. Distributions of Discrimination Indices[1] Based on the Upper and Lower 27 Per Cent of the Students Taking Each Section of the Pretest.

Discrimination Range	Theory Section Frequency	Laboratory Section Frequency
80-84	0	1
75-79	0	1
70-74	0	0
65-69	2	0
60-64	0	2
55-59	4	2
50-54	3	2
45-49	4	3
40-44	6	3
35-39	7	3
30-34	12	5
25-29	12	5
20-24	11	5
15-19	15	2
10-14	5	3
5-9	3	2
0-4	16	5

[1]See Davis (4, p. 13).

A discrimination index of 15 was accepted as the minimum level for retaining items. This cutting point resulted in 24 per cent of

theory test items being classified as failing to meet the acceptable level of discrimination. Twenty-three per cent of the items in the Laboratory Section of the pretest failed to meet the acceptable level of discriminating power. In each test the number of items to be re-edited or discarded represents about one quarter of the total pool of items.

In Table 4 the distribution of difficulty indices for the Food Theory Pretest indicates that 76 per cent of the items fall within the "ideal range" of 30 to 70. The data for the Laboratory Section of the Pretest show that 68 per cent fall within this range. Items outside the "ideal" range on both tests may still be utilized providing they occur within the limits of acceptable discriminability. (4).

Table 4. Distributions of Difficulty Indices[1] Based on the Upper and Lower 27 Per Cent of the Students Taking Each Section of the Pretest.

Difficulty Range	Theory Section Frequency	Laboratory Section Frequency
85-89	0	2
80-84	2	1
75-79	4	0
70-74	4	6
65-69	2	3
60-64	14	2
55-59	5	4
50-54	12	4
45-49	15	5
40-44	9	1
35-39	9	8
30-34	10	3
25-29	2	2
20-24	1	0
15-19	3	1
10-14	2	1
5-9	0	1
0-4	5	0

[1] See Davis (4, p. 38).

CHAPTER V

INTERPRETATION OF RESULTS

Summary and Conclusions

This study was concerned with the development of an instrument to be used as a pretest for a beginning college food preparation and service course. The test consists of two sections--written and laboratory--based on course objectives and generalizations.

The objectives and generalizations were compiled by the author and evaluated by a panel of experts from the Departments of Home Economics Education and Food, Nutrition and Institution Administration at Oklahoma State University. Special emphasis is given to the methods of developing the objectives and generalizations.

A one-hundred item multiple-choice theory pretest was developed by the author from the generalizations and from specific facts found in recent source materials. This test was evaluated by experts in Food, Nutrition and Institution Administration, Home Economics Education, and Testing and Measurements at Oklahoma State University.

An objective laboratory pretest was also constructed. The test was devised so that it could be graded by an inflexible key. Students were given problems to solve in relation to selection of equipment, recognition of standard products, identification of correct methods for critical steps in procedure, selection of food items for specific meal

occasions and recognition of errors in a set cover.

The Theory Section of the Pretest was administered to 138 students enrolled in beginning food preparation courses at Oklahoma State University. One hundred and fifteen students of the 138 taking the theory test also took the Laboratory Section of the Pretest.

The reliability of the Theory Section of the Pretest was found to be .83; the reliability of the Laboratory Section of the Pretest was .59.

Seventy-six per cent of the items on the theory section of the pretest proved to be discriminating, while 77 per cent of the laboratory pretest items were discriminating.

The distribution of difficulty indices for the theory pretest shows that 76 per cent of the items fall within the "ideal" range of difficulty level. The data indicate that 68 per cent of the laboratory pretest items are within this range.

Recommendations

The author does not believe that the Food Pretest is as refined as it can or should be before it is used. However, the analysis of the test does show that it has definite possibilities. Therefore, the test itself is not presented here.

It is believed that the Theory Section of the Pretest should have 150 discriminating items ranging in order of difficulty. This would probably raise the reliability coefficient. A longer test would make it difficult for the students to finish in a fifty-minute time limit, therefore a correction-for-guessing formula would be especially useful.

A larger number of test items is definitely needed for the Labora-

tory Section of the Pretest for the same reasons as given above.

The author believes that most of the alternatives for the laboratory test items can be photographed and the time, space, and expense for setting up the test can be held to a minimum. One item in the present laboratory pretest had photographs of a particular procedure as alternatives. The discrimination index for this item was 60 which is highly acceptable.

Another possibility would be to set the four alternatives up on movie slides and project the slides for use by a room full of students. A time limit could be set for each slide and time for a re-run of the alternatives could be allowed. This method would be a quick and easy way to test many students.

More data is needed to determine norms for using the test as a placement device.

The author plans to continue this study in an attempt to develop a valid, reliable, and objective pretest for a beginning food course that can be administered at a minimum of time and expense.

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APPENDIX

Food, Nutrition and
Institution Administration
Oklahoma State University
Stillwater, Oklahoma
February 28, 1962

Dear

Miss Edna Amidon has indicated that your college is working to develop a pre-test in the area of foods.

At Oklahoma State University a pre-test is being developed which it is hoped can be used in the following ways:

1. To exempt students with high scores from the first course in food preparation.
2. To section students with comparative abilities together.
3. To determine strengths and weaknesses of individual students.
4. To reveal to faculty areas which need to be stressed in teaching.
5. To motivate students to want to increase their present knowledge about food.

It would help in the development of this test to know something about what others are doing in foods pre-testing. Enclosed is an information sheet composed of questions concerning your pre-test. Would you, or the appropriate person in your college, answer the questions on this sheet?

If you are willing to send a copy of your pre-test it would be appreciated. However, it is understandable that you may not wish to release tests which need further refining.

Your cooperation in returning the question sheet at an early date will be greatly appreciated. If the pre-test which is developed here can be of help to you, we will be willing to share a copy with you when it is completed.

Very sincerely yours,

Virginia Steelman
Graduate Student

Helen F. Barbour
Head, FNIA Department

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INFORMATION SHEET FOR FOODS PRE-TEST

1. Purpose(s) for which pre-test is being used?

2. Level for which pre-test is used?

3. Length of time your test has been in use?

4. Time required to administer test?

5. Teacher time required in pre-preparation for test?

6. Cost of setting up facilities needed to administer test?

7. Approximate percentage of test composed of:

    a. Objective question?

    b. Performance in laboratory?

    c. Product judging?

    d. Other?

BEHAVIORAL-CONTENT ASPECT CHART OF OBJECTIVES

Content Aspect of the Objectives	Behavioral Aspects of the Objectives						
	Understands	Applies	Thinks Critically In Relation To	Directs Self In	Develops Attitudes	Develops Values	Appreciates
1. Food in relation to:							
A. Health for self and others	X		X	X		X	X
B. Values held by other cultures	X		X		X		X
C. Diverse patterns through which adequate nutrition may be met	X	X	X		X	X	X
D. Social values	X		X	X	X		
2. Contribution of processed foods to present day living	X		X		X		X
3. Terms used in handling and preparing food	X	X					
4. Sanitary practices in handling and preparing food	X	X	X	X		X	X
5. Psychological, economic, and social effects of food advertising in our society	X		X		X		X
6. Benefits which agencies provide the consumer	X		X	X			X
7. Responsibilities consumers have for supporting and informing agencies	X		X	X	X		X
8. Information which appears on packaged products	X	X	X				X
9. Body of current scientific knowledge of food processing and preparation		X	X	X			X
10. National and world food problems			X		X	X	
11. Food selection, preparation, and service as a means of creative expression	X	X	X	X	X		X
12. Wide use of food materials available	X	X	X	X			X

Content Aspect of the Objectives	Behavioral Aspects of the Objectives						
	Understands	Applies	Thinks Critically in Relation To	Directs Self In	Develops Attitudes	Develops Values	Appreciates
13. Facts and principles of food selection, storage, preparation and service	X	X	X				
14. Selection of meals for self and others	X	X	X	X	X	X	
15. Management of time, energy, and other resources in food selection, storage, preparation and service	X	X	X	X	X	X	X
16. Equipment needed in food preparation and service	X	X	X				
17. Ways in which foods are prepared	X		X				
18. Desirable combinations of foods	X	X	X	X	X		X
19. Desirable standards in food preparation	X	X	X			X	X
20. Worth of one's own food practices	X		X		X		X
21. Contribution of food and its service in fostering family relationships	X		X	X	X	X	X
22. Pleasures which may be found in eating food.	X				X	X	X
23. Evaluation and acceptance of new foods		X	X	X	X		
24. Knowledge food research provides and its contribution to the continued improvement of health						X	X

VITA

Virginia Purtle Steelman

Candidate for the Degree of

Master of Science

Thesis: DEVELOPMENT OF AN OBJECTIVE WRITTEN AND LABORATORY PRETEST BASED ON AIMS AND GENERALIZATIONS FOR A BEGINNING COLLEGE FOOD PREPARATION COURSE

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born in Prescott, Arkansas, August 14, 1940 the daughter of Homer and Mary Purtle.

Education: Graduated from Prescott High School, Prescott, Arkansas in 1958; attended Southern State College, Magnolia, Arkansas 1958-59; received a Bachelor of Science degree in Home Economics Education at Oklahoma State University in 1961; completed requirements for the Master of Science Degree in Food, Nutrition and Institution Administration at Oklahoma State Universtiy in May, 1963.

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