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A COMPARISON OF THE LABORATORY AND THE LECTURE DEMONSTRATION METHODS OF TEACHING SURVEY OF FOOD PREPARATION FOR FRESHMAN HOME ECONOMICS STUDENTS AT THE UNIVERSITY OF VERMONT

DISSERTATION

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

By

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* * * * * *

The Ohio State University
1960

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ACKNOWLEDGMENTS

It is very difficult for me to single out those persons who have made this study possible; my family whose support was always there; the encouragement of friends who understood; and my associates with whom I have had the privilege to work during my professional career.

I wish to make special acknowledgment of my deepest appreciation and gratitude to the following:

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My mother, whose loving care of my son while I have been studying made this venture a possibility.

My son, Robert, whose understanding and uncomplaining patience during the pursuance of this project were ever a source of comfort and solace.
PREFACE

In order to state the problem as fairly and as objectively as possible the hypotheses are given as null hypotheses. If a bias does exist in the minds of home economists and other educators, it is that overt laboratory participation is a necessary part of the learning experience in certain basic courses such as food and nutrition preparation in home economics.

Furthermore it has nowhere been suggested nor implied that this experiment proves or tends to prove the fallacy of the educational theory supporting student participation as an aid to learning. It may rather indicate that the participation may be so superficial in the basic foods course that the psychic and imaginative participation motivated by a good lecture demonstration teacher is equal to overt participation on the part of the students. This interpretation is further suggested by the increased verbal participation which the lecture demonstration classes may make possible.

The remaining problem for further research is to ascertain those areas which will most benefit from productive participation, and those which will not.
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CHAPTER I

INTRODUCTION, SCOPE, AND JUSTIFICATION OF THE STUDY

The nature of higher education and its availability is a controversial subject of concern to all educators. Because of the transitional changes in educational philosophies, home economics and other disciplines face a re-evaluation of their scope and their methods of teaching. Creative teachers are ever alert to the changing needs of students, and work to find the best method in which to impart their subject matter by relating it to past experiences, understandings, abilities and skills. The breadth and depth of knowledge which every college graduate of today must have at his command behooves all those concerned with the impartation of this knowledge to take a look at college curricula and evaluate whether the best use of student and instructor time and effort is being realized. The increased need for a larger amount of general and specialized knowledge in our complex and diversified society makes it imperative that only the most productive experiences should be required as part of the student's program. Every aspect of education is called upon to meet the challenge to its basic purposes in terms of present day civilization.
Realistically, no school can ignore professional training, nor can any school say that students do not need to have a liberal education. An educated man is able to make analogies between his own special competency and other fields. At the root of every discipline, there is one question that every teacher must ask himself, what am I trying to do when I teach? Jacques Barzun says, "the whole aim of good teaching is to turn the young learner, by nature a little copycat, into an independent self-propelling creature, who cannot merely learn but study - that is, work as his own boss to the limit of his powers."\(^1\)

Most home economics programs include a basic food course. This course is called Survey of Food Preparation, and is part of the core curriculum at the University of Vermont. The food and nutrition staff at the University of Vermont, as well as other authorities in the field, have questioned whether the food preparation laboratory course, as it is now taught, essentially adds to the knowledge of basic food principles and to the skill of the student in preparing certain foods. Does the achievement gained from a laboratory course justify the time required from students and faculty?

This question reflects the pressures of our times. The prevalent increase in the significance of general education at the college level, and faith in its value, are widespread among college teachers in the United States. We in home economics are concerned that the curriculum best meet the needs of the students it serves.

A college exists for the purpose of the students who attend it. Its entire corporate organization and all its activities are justified or fail of justification as they meet or fail to meet students' needs. Over the last hundred years we have come to regard the college not as benign intellectual dictatorship, but as an intellectual republic in which standards and continuity impose the need of intellectual control, but a control exercised for the interest of its citizenry and alert to their own sense of their own needs, subject to that sense but not subjected to it.²

Neither the mere acquisition of knowledge nor the development of skills can give our students the broad basis of understanding that they need for today's world. Home economics must continually look at its program, evaluating both its general and specialized education in the light of today's student and tomorrow's citizen. Educators should stand fast for those beliefs that help to mold tomorrow's

citizen but be flexible and ready to discard that which is no longer useful. Each program must be evaluated in terms of its particular students' needs. The important thing is the end product, recognizing that facts are important, but even more valuable is "... the man of ideas, with a mind accustomed not merely to holding facts in solution, but crystallizing them for use."3

The prediction of dramatic increases in student population means that all efforts must be made to use staff time wisely. Conversely, students should not have to take time to acquire skills they already possess, or could learn outside the classroom or no longer need. Staff supply in home economics has always been inadequate. It is increasingly acute today. This shortage does serve to emphasize the importance of improving the contributions of the faculty that we have. Every staff member should feel a strong personal responsibility for making an honest effort to improve his method of instruction. A good teacher is especially skillful in simplifying without watering down the complexities of his field of specialization. In discussing this situation, Philip G. Davidson,

3Barzun, op. cit., p. 39.
President of the University of Louisville, said that we must keep in mind the effect shortages have on students:

In making better use of our faculty we are concerned with multiplying excellence, not with compounding mediocrity. As we face a future of huge enrollments, new demands, deficient facilities, shortage of staff, and inadequate financial support, we shall find ourselves tempted with makeshift, short-cut, temporary expedients—and no doubt we shall be forced into many of them. We must not forget, however, that what is temporary in the life of the institution is permanent in the life of the student.4

The method of teaching should be in a climate so adapted to the ability of the student that the objectives and goals of the course are effectively achieved in terms of measurable learned behaviors.

Home economists believe that the high schools and other activities such as 4-H and Future Homemakers of America have developed programs which give many students skill experiences that should not need to be repeated at the University level. Serious doubt has been raised about the necessity and effectiveness of laboratory practices now being used. Do the learned behaviors in laboratory experience justify the time, energy and money cost?

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Home economists assume that management and equipment reach into every area of home economics teaching. Knowledge of management helps families use their resources so that they are better able to define their values and attain their goals. Knowledge of equipment helps families relate the selection, use and care of equipment to the home.

Home economists should review their objectives for their laboratory courses. This author proposes to investigate experimentally the teaching of the basic food preparation course at the University of Vermont. The University has used the traditional laboratory method of participation for each student.

This investigator believes that it is timely to find evidence that will reject or support the claim that the basic food laboratory course can be taught more effectively by traditional laboratory experience than by lecture demonstration and to determine whether students are able to recognize the relationship of home management and equipment to basic food preparation as effectively by lecture demonstration as by traditional laboratory experience.

"Considerable personnel, time, space, and apparatus are allotted to the operation of the undergraduate
laboratories; yet the research on their instructional effectiveness is practically non-existent. 5

To date home economics has no conclusive evidence that one method may or may not be as good as the other. If the lecture demonstration method of teaching basic food preparation is as effective as the laboratory method or vice versa, the affirmation of the following considerations would justify the one method over the other.

1. If the lecture demonstration method of teaching food preparation proves successful, fewer sections, less laboratory space, and less money for food would be necessary.

2. If the lecture demonstration method of teaching food preparation proves successful, more students not majoring in home economics would have an opportunity to take the course. Limited staff and laboratory space do not allow this at the present time.

3. If the students evidence the need for laboratory participation in basic food preparation the University of Vermont will feel justified in including this in the curriculum in spite of the increased time, effort, and

money demanded by both students and staff for the course. Such evidence will reinforce the reason for requiring each student to take the traditional food laboratory course.

4. If the lecture demonstration method is equally as or more successful than the laboratory method, this may mean a rethinking of requirements. Perhaps skills are more needed and should be taught in the junior and senior professional courses rather than in the basic courses which are an introduction to home economics. The basic course at the University of Vermont is not a professional course in food and nutrition, but is required for all home economics students regardless of their professional interests.

5. There seems to be a question as to whether knowledge about food or whether manipulative skills are strengthened when each student makes a single product once.

6. If the lecture demonstration method is more or equally as successful as the laboratory method in terms of achievement scores for teaching food preparation, the same could be true when integrating the teaching of management and equipment which is related to food preparation.

7. If the lecture demonstration method or a modified demonstration method of teaching could be used as effectively as the laboratory method, great savings in costs would be realized.
Statement of the Problem

General objective - to compare the relative effectiveness of two teaching methods, lecture demonstration and laboratory, in the teaching of basic food preparation to selected home economics freshmen in the Department of Home Economics at the University of Vermont.

Definition of Terms

1. **Laboratory Method**: the instructor gives the background and directions for making the product or products which are to be made by each student or each student and her partner; the students may ask questions; after the product or products have been completed they are evaluated by the class and the instructor.

2. **Lecture Demonstration Method**: all activity is carried on by the instructor; the students observe the demonstration of the product or products being made by the instructor; she lectures as she demonstrates; the students may ask questions during the demonstration; the finished products are evaluated by the class and the instructor.

3. **Self Initiated Laboratory**: students are required to attend the laboratory period, but may come on their own volition in order to practice making any food product which they feel will strengthen their understanding
of basic food preparation; the laboratory is supervised by an instructor.

**Basic Assumptions**

This study was based on the following assumptions:

1. For freshman home economics students at the University of Vermont, basic knowledge of principles, as well as some skills of food preparation are taught in Survey of Food Preparation.

2. Manipulative skills are not gained through the process of each student making a food product once in Survey of Food Preparation.

3. The traditional laboratory and the lecture demonstration method can be taught as two distinct methods in Survey of Food Preparation.

4. The differences in the effectiveness of these two methods will be revealed by the measuring devices to be used.

5. By the criteria used to set up the two experimental groups, no one factor other than the teaching method, will influence one group more than the other.
Statement of Hypotheses

**Hypothesis I**

There will be no significant difference between the mean scores of freshman students who are taught basic concepts of food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently being used in the Home Economics Department at the University of Vermont as measured by the current test using curricular (content) validity.

**Hypotheses II through IX**

There will be no significant difference between the mean scores of freshman students who are taught the basic concepts of food preparation in the

- beverage unit
- fruit and vegetable unit
- starch and milk unit
- cheese unit
- egg unit
- meat unit
- batter and dough unit
- deep fat fry unit

through a lecture demonstration method and the mean scores of students taught these units by the laboratory method currently used in the Home
Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.

**Hypothesis X**

There will be no significant difference between the mean scores of freshman students who are taught basic management and equipment concepts related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by curricular (content) validity.

**Hypothesis XI**

There will be no significant difference between the mean scores of freshman students who are taught basic concepts of money and time management as related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.
Hypothesis XII

There will be no significant difference between the mean scores of freshman students who are taught basic concepts of equipment as related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.

Hypothesis XIII

There will be no significant difference between the mean scores of freshman students who are taught the practical application of basic food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit test using curricular (content) validity.

Specific Problems

1. The description of the two methods, lecture demonstration and laboratory, used in the teaching of basic concepts of food preparation to Home Economics freshmen at the University of Vermont.
2. The measurement of the relative effectiveness of the instruction of basic food preparation in the group in which the instruction was by lecture demonstration as compared to the group in which the instruction of basic food preparation was by laboratory participation.

3. The measurement of the relative effectiveness of the instruction of management and equipment as related to basic food preparation in the group in which the instruction was by lecture demonstration as compared to the group in which the instruction of management and equipment related to basic food preparation by the laboratory method.

4. The analysis of the relative effectiveness of the instruction of basic food preparation in the group in which the instruction was by lecture demonstration and in the group in which the instruction was by the laboratory method.
CHAPTER II

REVIEW OF LITERATURE

This survey attempts to cover those aspects of the literature which are pertinent and relevant to the proposed study: first, the importance of teaching knowledge, principles and skills about food, management and equipment as related to food to freshman students in home economics; second, an overview in support of teaching a knowledge of food preparation, principles and skills by the laboratory method, and the advantages of teaching a knowledge of food preparation, principles, and skills by the lecture demonstration method; third, previous studies relating to the teaching of a knowledge of food principles and skills by the laboratory method versus the demonstration method of teaching.

The Teaching of Food, Management and Equipment as Related to Foods

Teaching Basic Foods

A knowledge of the principles and skills of food preparation is important to the well-being of all individuals and families. It is important not only to recognize the
nutritive value of food, but one should be able to understand the basic principles and skills as well as the management in the preparation of food. Only then will it be possible to take advantage of the abundant and varied food supply in order to give optimum health and welfare to each individual and family.

People devote much time and effort and thought to food—to producing the assortments of food that they need and want and to processing, distributing, and serving food in the places, at the times, and in the forms it is wanted.

People always have known they must eat to live—children to grow normally and adults to keep strong... Modern science shows that all of us, regardless of purse, can add years to our life and life to our years if we apply knowledge about nutrition to our selection and use of food.®

What is essential today in teaching the basic food preparation course? Home Economics New Directions, A Statement of Philosophy and Objectives states our concern with certain aspects of family living. Two aspects of concern are stated here:

"Nutritional needs and the selection, preservation, preparation, and use of food.

---

"Management is the use of resources so that values and goals of the individual, the family, or of society may be attained."\(^7\)

The Committee further states that -

We believe that the clearest new direction for home economics is to help people identify and develop certain fundamental competences that will be effective in personal and family living regardless of the particular circumstances of the individual or family.\(^8\)

Many of these competences which are fundamental to effective living are inherent as part of the broad aims in teaching basic food preparation. These aims are stated below:

- establish values which give meaning to personal, family, and community living; select goals appropriate to these values.

- create a home and community environment conducive to the healthy growth and development of all members of the family at all stages of the family cycle.

- achieve good interpersonal relationships within the home and within the community.

- nurture the young and foster their physical, mental, and social growth and development.


\(^8\)Ibid., p. 8.
- make and carry out intelligent decisions regarding the use of personal, family, and community resources.

- establish long-range goals for financial security and work toward their achievement.

- plan consumption of goods and services--including food, clothing, and housing--in ways that will promote values and goals established by the family.

- purchase consumer goods and services appropriate to an over-all consumption plan and wise use of economic resources.

- perform the tasks of maintaining a home in such a way that they will contribute effectively to furthering individual and family goals.

- enrich personal and family life through the arts and humanities and through refreshing the creative use of leisure.

- take an intelligent part in legislative and other social action programs which directly affect the welfare of individuals and families.

- develop mutual understanding and appreciation of differing cultures and ways of life, and co-operate with people of other cultures who are striving to raise levels of living.9

The objectives of any course in home economics should be student centered with these competences in mind. Thus focused, achievement can be measured in terms of

9Ibid., p. 9.
student behaviors. Objectives and goals are essential in guiding and directing the teaching of foods. Justin, Rust, and Vail set forth objectives for the introductory foods course as follows:

I. Those objectives which this course shares with one or more other courses included in the college curriculum:

1. To develop the ability to make sound interpretations from an experiment and to distinguish among conclusions that can and cannot be safely drawn from the data; those that are contradicted by these data; and any such unacceptable interpretation as false analogies and appeals to authority.

2. To develop skill in recognising the relevance of subject matter studied and in applying it in the solution of one or more related problems.

3. To increase written and oral communication skills.

II. Those objectives which are specific for this course and the subject matter area from which it is derived:

1. To develop an interest in and an understanding and appreciation of the nutritive value of foods.

2. To develop an understanding of the wide expenditure of the food dollar.

3. To have a working knowledge of principles relating to food preparation.

4. To develop an understanding of the principles of sanitation as these apply to the work centers and procedures used in food preparation and clean-up.

5. To establish desirable standards for meals prepared and served in the home.
6. To appreciate attractive meal service.

7. To develop managerial skills in planning, preparing, and serving adequate and attractive meals for the day.

8. To develop interest in selection, arrangement, care, and efficient use of the kitchen and its equipment.

9. To develop interest in selection, care and use of silver, glassware and china and other necessary accessories.

10. To understand and appreciate social amenities as a force in our civilization.10

In 1955 a group of college teachers met in Washington, D. C., to consider some questions and problems facing college teaching in food and nutrition. They developed and set forth aims and goals for food and nutrition courses taught at the elementary level. Those aims which relate directly with the preparation of food were as follows:

Aims Related Primarily to Food

18. To develop an ability to plan, prepare, and serve meals efficiently within time, energy, and money limitations.

19. To acquaint students with tools and equipment suitable for different types of food preparation and an efficient arrangement and use of them.

20. To develop an appreciation of food preparation as a means of creative expression.

21. To develop an awareness of those factors which determine the qualities, including grades and standards, of food and their effect on selection and utilization.

22. To develop an understanding of the importance of food sanitation and those procedures which prevent infestation and food-borne diseases.

23. To develop an understanding of values in different plans for food preparation and service adapted to present-day living.

24. To develop some ability to achieve values desired with time and facilities available.

25. To develop an appreciation of values derived when different members of the family share the activities involved in feeding the family.\(^{11}\)

Time, energy and money management as well as the choice of equipment are such an integral part of food preparation, as attested by their inclusion in food and nutrition course objectives, that management and equipment

certainly should be integrated into the entire teaching program of this subject matter.

Food management includes planning meals, choosing and buying the food, storing food supplies, use and storage of equipment used to prepare food, planning the service and preparing the food. There is no easy way to solve the problems involved in food management, but they are most satisfactorily solved when the process of decision-making is employed.

Genuine decision-making is conscious behavior; it involves the perception of a situation and the ability to infer or predict future outcomes of action steps taken to change the situation. . . . Through the process of thinking through some possible alternatives, the individual attempts to calculate what the future will be like if he arrives at a solution through the implementing of one of the alternatives.12

The teacher of the home economics basic food course is obligated within the approximately defined limits of her classroom to guide and direct her students so that they acquire the knowledge for making the best possible decisions in relation to food preparation.

A large measure of the teaching of home economics is devoted to helping

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girls and/or boys learn to use human resources in such a manner that they will be able to achieve the kinds of goals they desire for living in their present family as well as establish patterns for living in future families.13

Money, time and energy management are as important a consideration in food preparation as actually preparing the food itself. A large share of the family's budget is spent for food. In 1946, 30.5 per cent of the national income was spent for food.14 The Department of Labor, Bureau of Labor Statistics, found that the average family was spending about the same percentage, 30.2, for food in 1950.15, 16 The lower the income, the higher the percentage of the budget allotted for food. Price is important, but of just as great or even greater consideration is the ability to spend the food dollar to the greatest advantage. This means good management.

Time and energy are also important considerations in food preparation. "... the feeding of the family,

13Ibid., p. 32.


which includes preparation and serving of food and clearing away after meals but not the planning or purchasing, is the most time-consuming activity in the household. Therefore, it would be most imprudent to teach basic food preparation without considering time and energy management. Another integral part of teaching basic food preparation is the use and choice of equipment. Nickell and Dorsey say that selection and use of equipment is one of the major problems in food management. The kind of equipment a person uses, its selection, use and care are dependent upon what choices are made. Individuals and families should be influenced by their need for the product, storage space available, the kind of materials that affect time and energy, and financial resources, as well as other family needs.

The teaching of basic foods should not become narrow in its scope, but should be in tune with the world in which the students live. Food management is closely related to human relationships. The understanding of the likes and dislikes of social and ethnic groups constitute a part of developing a broader understanding of each

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18 Ibid., p. 375.
other's culture. There was a time when what a man ate depended upon what he could obtain from within the boundaries of his habitat. Even with man's mastery of his environment, he does not often enough have the courage to be adventuresome in trying the new and the unusual. Justin, Rust and Vail say:

At the same time that increased knowledge directs him to wise selection, however, the social implications of food and eating have become numerous and impelling. 19

Tradition and customs, economic status, personal likes and dislikes, ease of food preparation, and the knowledge of food needs, influence the diet of the individual and the family. "The diet of the American people reflects directly the increasing knowledge of foods and the body's need for them." 20 However, information is not enough, but an understanding of and the ability to make this knowledge effective through careful selection and preparation of food is essential.

The Teaching of Foods in These Changing Times

Home Economics as a profession recognizes that it is important to guide its research and teaching in light of

19 Justin, op. cit., p. 59.

20 Ibid., p. 65.
the changing times of our society. "Home economists must be the first to anticipate and recognize change, to weigh the capacities of the individual to meet new demands, and to set new directions for professional programs of benefit to families."21

Leadership in the Field

Dr. Dorothy Scott says that home economics will look to food and nutrition college teachers for determining the direction college home economics will take. Her reasons for this are stated as follows:

1. You are one of the earliest of our 5 subject matter areas to be established.

2. The scope and nature of your subject matter is probably best known and most easily identified.

3. You have more research to your credit and many in your area hold advanced degrees.

4. You have rich and well developed funds of knowledge in related fields of science.

5. Your field has great social and political significance in the world today.

On the other side of the ledger, you

21Philosophy and Objectives Committee, op. cit., p. 8.
share with some areas of home economics and certain sciences, these problems:

1. You include and your profession calls for techniques and skills on the job. How and when are they best achieved?

2. Food and nutrition ranges from elementary education to the post doctoral level. What is the focus at each level? How do you differentiate?

3. Other sciences claim much that we consider "food and nutrition." What is your unique role?

4. You have been accused of being over subject-centered. Can you make the most of the social significance of your area?22

Some Questions and Recommendations by Educators

If food and nutrition takes leadership in curriculum planning, as Dr. Scott says they should, nutritionists must dare to experiment. What is essential today, and what can be omitted yet still prepare students for the best possible background to live in a rapidly changing world? There is

22 Dorothy Scott, "Changes in Home Economics Curricula with Implications for College Departments of Foods and Nutrition," Address to the North Central Regional Conference for College and University Teachers of Food and Nutrition, Chicago, Illinois, October 9, 1959.
more to learn, and less time to learn it. Ercel S. Epp-
right asks how realistic is our teaching:

For example, do we ignore the wide variety of mixes and prepared foods that are available on the market and their influence on the home-makers' management of meals; do we make the best use of new equipment? . . . Do we try to evaluate which parts of our traditional food and nutrition course have values which we cannot afford to lose and which parts we keep simply because we hesitate to change?28

It is recognized that there has been a large in-
crease in all special fields of knowledge, and in addition much more general knowledge is required of today's educated man. There should be a serious attempt to cull item by item course content as well as to evaluate the method by which the subject matter is taught. Certainly there are many kinds of indications that progress has been made, but there is still a long way to go. D. A. Worchester asks if we travel the same road too often. He goes on to say,

We are all familiar with studies which show that the first course in college chemistry is more like the course in high school chemistry than it is different from it. A University professor told me he assumed that his students knew nothing at all of United States history when they came to his class. This in spite of the fact that almost all had studied the subject in

28Eppright, op. cit., p. 596.
both grade school and high school. A student is required to take English composition in college even though he may already write better than most of his classmates will at the end of the course.24

Thelma Porter suggests we should, perhaps, give serious consideration to pre-testing in regard to this problem.

As far as the area of foods and nutrition is concerned attention should be given to recognizing the knowledge and skill the student already possesses when she comes to college. College students are not interested in repeating what they may already have "tasted" in their earlier education. Perhaps pretesting, especially in the area of food preparation, should be used to a greater extent than at present.25

In May, 1958, another food and nutrition conference was held in which was discussed a re-evaluation of the food and nutrition curriculum. Some major items were discussed:

1. Basic principles or key ideas which we all agree students need to understand in order to achieve goals.

2. Content of beginning courses.


3. Scientific principles which we believe our students need.\textsuperscript{26}

Worchester concludes his attack upon the lethargy of teaching with this well-taken hopeful note: "Our educational system is a good one and our basic philosophy is sound, but there are many changes we need to make to keep up with our rapidly developing culture."\textsuperscript{27} An evidence of home economics meeting such a challenge is the convictions arrived at by a national conference on teaching food and nutrition held in 1956. Some of these that might be directly related to the teaching of the basic food preparation course are presented:

1. Standardized courses are neither necessary nor desirable.

2. Reviewing the objectives of any course and categorizing them into major groups of aims may help one to analyze what is really important.

3. All courses should be examined frequently to be sure they bring out key ideas.

4. Revitalizing a course requires much preplanning, research, and making better use of resources available.


\textsuperscript{27}Worchester, \textit{op. cit.}, p. 518.
5. Experimentation with teaching methods and content is desirable. Older concepts should be examined and retained only when shown to have merit in terms of today's needs.

6. In some cases, food and nutrition programs may be weak in their failure to apply principles of management.28

Related to the sixth challenge, Lila Jones says that teachers of foods must take into consideration the revolutionary methods of merchandising and processing foods, trends in food preferences, and the changes in kitchen equipment.29 This investigator finds that there is much discussion of what needs to be done, and what is wrong with teaching today, but very few answers to the multitude of questions that are raised.

Home economics must carry out experimental research that will give a basis upon which recommendations for changing course or method of teaching may or may not be recommended depending upon experimental evidence. Dean Helen LeBaron of Iowa State University says that -

If college teaching is to be effective we must be sure that the method


employed is the most effective one possible. Up to this point we have supported our prejudices as we have defended one method against another. Research which will give us some scientifically based findings will be most helpful to all of us who are concerned with administering college home economics programs.

Catherine Personius, Head of the Department of Food and Nutrition at Cornell University says that many persons are questioning if the traditional emphasis on laboratory work is necessary or desirable, and she further states that,

Personally I am convinced that we can, in many instances, decrease the time presently being devoted to laboratory work. But what can be omitted and what experiences can be given by other methods is yet to be determined. We have little evidence on which to make sound decisions concerning alternatives.

Advantages and Problems Related to Teaching by Laboratory or by Lecture Demonstration

The home economics college curriculum and what is done to it holds the key to the future of this profession. To develop intellectual attributes in students, the best


possible method for the specified subject matter must be employed in the classroom. The laboratory method has been a prevalent classroom procedure used in teaching basic food preparation. There has been and still is much questioning as to whether the laboratory method is the best way to teach subject matter. The lecture demonstration method of teaching has often been suggested as an alternative or in addition to the laboratory method. The merits and weaknesses of these two methods are herewith discussed.

Laboratory Method of Teaching

Home economists generally agree with the following statement:

Laboratory activity is planned so as to provide for extension of the student's understanding and establishing a close relationship to other class activities. The activities suggested are directed toward heightening student interest and deepening student understanding in this subject matter field.32

Individualized instruction was one of the earliest methods of teaching in this country. Later in the interest

32 Justin, op. cit., p. x of the preface.
of efficiency, techniques were developed so that larger
and larger numbers could be taught together.

Group instruction, which was such a vast improvement over the individual
instruction of the previous century, became a formalized routine to which
all pupils were forced to conform . . . all pupils, without regard for
their native ability, previous experience, or social status, were expected
to master the same subject matter,
achieve the same standard of excellence, and maintain the same rate of
progress.33

Group instruction became, however, very rigid, and as the
pendulum swung too far in this direction, individualized
instruction again was considered as a methods possibility
for teaching.

Briggs says that probably, more than any other one
person, Frederic Burk should be given credit for various
efforts to individualize instruction to suit the subject
matter and the student. " . . . Burk, with his associates,
developed a system of exercise or assignment books which
made it possible for each child in a class to proceed at
his own learning rate and which freed the teacher to render
service to each individual child."34


34 Ibid., pp. 9-10.
The college instructor, although vitally interested in general technique and its applicability to his or her specific situation, is not disposed to accept enthusiastic adherents to a specific technique without consideration of the scientific evidence to support such claims. Briggs and his associates collected and evaluated the available research materials dealing with laboratory techniques of instruction in secondary schools. These materials included studies made in junior high school through junior college. Seventy-nine studies dealt with the effectiveness of the laboratory techniques in the achievement of facts.

Briggs further states, "It can be concluded that research thus far offers no conclusive evidence that attitudes, interest, and habits are developed or modified better by one classroom technique than by another."35, 36 However, with the voluminous evidence presented in these studies the majority of opinions prefer the laboratory techniques to the more traditional procedure of teaching. Richardson and Cahoon set forth two purposes of the laboratory method in teaching science.

The use of individual laboratory procedure may serve any one of several purposes. Two purposes that have

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35 Ibid., p. 45.
### TABLE 1\(^{36}\)

NUMBER OF STUDIES FAVORING OR OPPOSING LABORATORY TECHNIQUES AS A METHOD FOR AIDING PUPILS IN THE ACQUISITION OF FACTS

<table>
<thead>
<tr>
<th>Studies</th>
<th>Supported by Statistically Significant</th>
<th>Supported by Not Statistically Significant</th>
<th>Supported by Subjective Opinion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Studies favoring laboratory techniques</td>
<td>17</td>
<td>27</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>B. Studies showing no conclusive differences</td>
<td>0</td>
<td>19</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>C. Studies favoring traditional methods</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>54</strong></td>
<td><strong>6</strong></td>
<td><strong>79</strong></td>
</tr>
</tbody>
</table>

\(^{36}\)Ibid., p. 34.
frequently been associated with the
typical laboratory procedure are
(1) development of skills and tech­
niques, and (2) verification of prin­
ciples or phenomena already discussed
. . . the lack of satisfaction of
science teachers with the results
secured in their teaching poses a
serious doubt as to whether they
should rely upon the laboratory for
verification and confirmation. There
is doubt, also as to whether exper­
imental methods or critical thinking
can be effectively taught in the
absence of real experimentation on
the part of the student. 37

This concern about whether or not laboratory exper­
ences change behavior stems from the question of what is
the best method of communicating meaning to the student.
It is interesting and appropriate to take a look at what
Babcock says are four conditions essential for the develop­
ment of meaning:

1. A broad background of related exper­
ences, facts, and principles.

2. An awareness of relationships exist­
ing between past experience and pres­
ent experience.

3. An awareness of logical relation­
ships into which the experience may
be organized.

37 John S. Richardson and G. P. Cahoon, Methods and
Materials for Teaching General and Physical Science (New
4. An awareness of relationship existing between present experience and possible future application of derived meaning.38

The question arises as to what is the best possible way in which we can achieve this kind of knowing. Sasman says that the learner becomes personally involved when he is in a laboratory situation, and that the laboratory can bring out desired behavior change.

The laboratory should be organized around the personally significant problems of the learner. . . . Laboratory activity should be designed to release the learner from personal insecurity and tension.

Personal involvement should encompass the cooperative selection of problems, planning for their solution, fact collecting, decision making, and decision implementation.

. . . The laboratory should provide opportunity for direct experience with people and things and processes— as opposed only to verbal symbols or words about them—about which reliable knowledge is to be established.

The laboratory should provide guided experience in the interpretation of people's doings and of the things and processes in the community.39


Ercel S. Eppright in her article, "College Teaching of Food and Nutrition," asks, "Should we section or group students with different learnings and/or skills in different laboratories; excuse some students from some course or part of a course; plan the problems in a particular course to fit the needs of the individual student? This goes back to the fact that the atmosphere for learning in any given classroom is dependent upon the teacher, the school as a whole, and the student.

Existing literature does suggest that effective provisions can be made for individual differences and for socializing experience through the laboratory method if the teacher is sufficiently skillful and resourceful. In recent years the name "laboratory method" has occurred less often and other concepts of method tended to replace the laboratory concept.

Dean Doretta Hoffman of Kansas State University says that there is no question about the dire need for experimental research in all instructional fields of home economics, and

As an administrator in home economics
I am aware of the fact that our students are required to take much laboratory work as they complete requirements

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40 Eppright, op. cit., p. 596.

for a degree in home economics. I am convinced that some, perhaps much, of the laboratory work is essential in home economics teaching. Research studies are needed however, to help answer the question as to what amount of laboratory work is absolutely essential.42

Lecture Demonstration Method of Teaching

The gap between educational theory and classroom practice is an increasingly serious problem. The lecture demonstration method of teaching is a means of presenting visually and audibly a selected body of information. Home economics faces a serious lack of adequately trained staff, with a correspondingly larger student body and limited physical plant. Home economists may have to consider methods of teaching infrequently used.

The force of circumstances may bring us to the reduction of laboratory time, more use of the lecture demonstration method (possibly with television), more group projects, and more independent study. Two important desirable outcomes of changes in method seem possible; the development of greater ability on the part of our students (1) to do "hard thinking" and (2) to do independent, creative work.43


43Eppright, op. cit., p. 597.
Richardson and Cahoon say that the purposes for which lecture demonstration have proved to be effectively functional are (1) motivation; (2) explanation of a principle or application; (3) preview of a unit of work; (4) provision for various phases of teaching for thinking; (5) provision for particular student needs or interests; (6) exemplification of a skill or technique; (7) review; and (8) evaluation.44

Hoover has successfully taught methods of teaching by demonstrating the teaching method. This would simulate apprenticeship learning. He discusses how Arizona State College organized their methods course around simulated situations. Instead of being taught through lectures, however, the methods are 'taught' through demonstration and application of the method under consideration.45 For example, the conference method would be taught through the actual demonstration of the conference method.

Mary Brown Allgood says that demonstrations should leave the student with the desire for a continuation of work rather than with completed satisfaction. In the lecture demonstration the teacher presents the proper method

44 Richardson and Cahoon, op. cit., p. 16.

of procedure for the desired results, points out new techniques she wishes to be developed, and sets up standards for the class and the individual.\footnote{46} The student is subjected to the best known method of preparing a product, as well as seeing a standard product finished.

Specifically in teaching foods Miss Vivian Rockwood of the University of Wichita states that,

The values of the demonstration method to students are: references are read with greater understanding, it eliminates doubts in their minds, eliminates time wasted by trial and errors, it gives confidence to go ahead on their own, they think more clearly before acting if they've seen and heard the procedures demonstrated, it gives an example in the initial stage of learning a new process or method, they pick up ideas faster than if told, it is one way of helping students be more observant and cost conscious . . . impressions gained from seeing are more lasting. . . .\footnote{47}

Osee Hughes gives in the foreword to her book, *Introductory Foods*, some observations about why she feels demonstrations


\footnote{47}Vivian Rockwood, "The Place of Demonstration in Teaching Food Preparation Courses," Paper given as part of a Symposium, *This is How We Are Teaching*, at the 1958 Conference of College Teachers of Food and Nutrition.
may be a means of accomplishing numerous worthwhile objectives.

Some demonstrations may be experiments designed to show the effects of variable factors on the finished product obtained. Other demonstrations may aim to show only the most desirable techniques to use. The latter are particularly valuable where difficult techniques are involved. With the demonstration method, fundamentals can be taught with less expenditure of time and effort and the student profits greatly by seeing a more experienced person's handling of foods.48

A problem often discussed in relation to the advisability of teaching basic food and nutrition by demonstration is how important is the development of "skills" at this level. Eppright gives one answer to this problem by raising another.

It is only realistic to recognize that in the classroom it is unwise to spend the time necessary to produce great skill in food preparation. We recognize, however, that competence and some skill in food preparation are expected of our graduates. What measures are we taking to provide the motivation that will lead students to acquire the necessary skill outside of class?49


49 Eppright, op. cit., p. 597.
It is possible that a well executed demonstration could give the student motivation to go ahead on her own in developing skills. The demonstration method could be successful in conducting the teaching of foods as suggested by Thelma Porter:

\[ \ldots \] one might speculate on the outcome of teaching foods by starting out at the freshman level with a set of principles such as the effects of temperature changes on proteins, fats and carbohydrates; the nature of emulsion and gels; the character of solutions and suspensions; the action of leavening agents; the behavior of crystals, the phenomena of oxidation and reduction, to mention a few. Simple systems of materials such as egg albumin, gelatin, gluten, salts, sugars, starches, oils, and water might be employed. The combination and preparation of plant and animal products into things fit to eat could conceivably be limited to a few food products which would represent classes, types, and/or principles of handling. The student herself would be responsible for sufficient practice to develop skill.\[50\]

The lecture demonstration method of teaching has not been used as extensively as it could be if we are to believe the purposes that it serves as stated previously by Richardson and Cahoon. Some data, it is true, have been collected which build experimental evidence for the effective use of lecture demonstration as a method of teaching.

\[50\] Thelma Porter, *op. cit.*
Such evidence, however, is inconclusive and incomplete.

**Laboratory Participation Versus Lecture Demonstration Method of Teaching**

Is there a "best way" to teach foods to the college student today? Louise Stanley says that a student in home economics should

have an appreciation of both the science and art underlying the job of preparing three meals a day. The rapidly developing science of nutrition is showing the relation of food to health and determining what should be eaten within certain wide ranges. It is equally important that science should contribute to the selection and preparation of food. It is hoped that by showing the scientific implications of food preparation, interest in it as an art may be stimulated.\(^1\)

Are we teaching the home economics student with the best method possible in order to gain this concept of foods? M. I. Berger says that there is no evidence in the literature that there is one best method to teach.

There cannot be one method that will resolve the problems of "education." Each level needs to work out its own way of teaching. Equally important each school needs to understand the

What is best for the student is of utmost concern to all educators, and Catherine Personius says that one decision constantly facing all of us concerned with the teaching of food preparation is the amount of emphasis we should give to laboratory work.

We all know that laboratory teaching is costly in terms of student and teacher time and of physical facilities; to be justified it needs to be shown to have a high degree of educational effectiveness. This decision becomes an especially critical one at this time when we are faced with an increasing number of students to be accommodated in our colleges as well as with increasing costs of education.

Ruth Eckert summarized a talk on "Improvement of College Teaching" that she made at an annual meeting of the American Home Economics Association in the following manner:

Certainly the studies made to date do not suggest that there is any one best method of teaching. Rather they underscore the fact that effective teaching is really a subtle and intricate affair, with methods...
intelligently adjusted to many factors. The solutions we each must develop must thus be our own, since teaching is an intensely personal matter. Yet the test of any method would seem to lie in the degree to which it arouses students to active, sustained efforts. Good teaching may differ worlds in its methods, but it stimulates students' thinking.54

"The trouble with the world today," says Bertrand Russell, "is that the stupid are cocksure, while the intelligent are full of doubts." Now this may be true, however, let us take a look at the experimental evidence that may give a clue as to whether the best method of teaching courses ordinarily taught by the laboratory method could be as successfully taught by lecture demonstration.

Educators have been concerned with the method of teaching by laboratory versus lecture demonstration for a long time. In 1928 Hurd carried out a study, "The Present Status of Lecture Demonstration Versus the Laboratory," teaching natural sciences at the secondary school level. The use of the lecture demonstration method experimentally supported the fact that it seemed to be equal to, if not superior to individual laboratory work, and was more economical of time and expense. Many teachers of science,

however, are not convinced and are unwilling to admit that the mainstay of instruction in science, the laboratory method, as opposed to other fields, should be done away with.

The main contention seems to be that the tests used so far do not measure certain very desirable abilities gained from the pursuance of laboratory work. These teachers still claim that skill in manipulation and real acquaintance with methods will come only through actual individual work in the laboratory.\textsuperscript{55}

In 1928 a similar study was made by Palmer O. Johnson on the teaching of high school biology. In the lecture demonstration the instructor performed the laboratory exercise, and in the laboratory method each student performed the exercise.

Although . . . it cannot be conclusively stated that it is superior, since the obtained differences were not found to be statistically significant . . . it is apparent that the demonstration method of laboratory instruction may be expected to yield, if not larger, at least equal

returns in primary learning when compared with the group or the individual method. 56

One of the earliest experiments carried out in home economics was by Katherine Comley and Clara M. Brown in experimenting on the demonstration and laboratory methods of teaching meal planning and serving. They found that the groups taught by the demonstration method made significantly higher mean scores on a test covering information and applications than did the group taught by the laboratory method where students prepared individual servings of a given food. The demonstration group seemed to manage their luncheons better as well as have more variety and better ideas of food combinations. The cost was about half that of the laboratory. 57

Comley and Brown concluded, however, that,

The exclusive use of the demonstration method is not advocated, since obviously practice in preparing and serving foods is needed if students are to be taught to carry on this important task at home. However, after girls have developed a fair


amount of skill in food preparation, then demonstrations may well be sub-
stituted for or combined with the usual laboratory procedure.

In 1941 an experimental study was made in teaching freshman food preparation. The students were allowed to choose the traditional laboratory section, using the method in which the instructor gave instructions and the students did individual work, or the laboratory section where the instructor, sometimes with the help of the students, demonstrated processes and procedures. After the demonstrations those students who needed to practice were allowed to do so. The students determined how much additional time they needed for practice in order to meet high standards of proficiency set up in the course.

Bloye and Long concluded:

The choice of method of class instruction in the foods laboratory produced no measurable differences in either the average scores earned by the freshman group or among those who proceeded into the sophomore class. In laboratory technique half of the sophomore group made scores very like those which they had earned in freshman foods work. Among the

58 Ibid., p. 470.

other half, the high scores were divided equally between those who chose the demonstration and those who chose the laboratory method of teaching. 60

The sciences just as does home economics teach many of their courses by the laboratory method of instruction. Since the experiences gained and the changed behavior expected from these experiences produce the same kind of learning patterns, experimental results from studies in one field can be indicative of what might be expected to happen in another field. In spite of the amount of time, space, and equipment that it takes to operate a laboratory, the amount of research on its instructional effectiveness is practically non-existent. 61 When comparing the laboratory and demonstration methods of teaching basic physics courses Kruglak found that

the conventional method in the physics laboratories was more effective than the demonstration method for the teaching of instrumental situations, simple measuring techniques and problems involving apparatus. It was also concluded that neither method was superior for the complex laboratory

60 Ibid., p. 472.

61 Kruglak, op. cit., p. 293.
problems. The experimental evidence appeared to justify the conclusion that neither method influenced measurably the scores on pencil-paper tests based on the material of lectures and laboratory work.\textsuperscript{62}

On the basis of this experimental evidence, Kruglak recommended that present instructional practices be modified, that a combination of the conventional and demonstration methods be used, and that the more complex experiments be put into the hands of an able demonstrator.\textsuperscript{63}

The third experimental study written up in the literature on a comparison of two methods of teaching foods and nutrition was conducted at Michigan State University.

May S. Bay in a master's thesis made an experimental study comparing the individual laboratory and modified demonstration as a method of teaching. This study was similar to the 1941 Bloye study except that instead of using the help of students, the instructor gave the entire demonstration. In addition to seeing the demonstration performed, each student had supervised practice periods for individual experience in half of the scheduled demonstrations. Both groups had additional lecture classes and review sections. Bay found that under the conditions of

\textsuperscript{62}\textit{Ibid.}, p. 299.

\textsuperscript{63}\textit{Ibid.}, p. 300.
this experiment there was no statistically significant
difference between the groups on the basis of final grade,
and concluded that it is questionable whether the students
learned more through the use of one teaching method or
another.64

As can be ascertained from the above review there
is comparatively little written and few studies have been
made about the merits of the laboratory as compared to the
demonstration. What is available is inconclusive and con­
tradictory.

Sasman says:

For an invention as old as the labora­
tory method there is, surprisingly,
little research done to test hypotheses
underlying the idea. Many claims are
made in opinion literature. It's high
time that research be done to test
the validity of hypotheses and to
bring about necessary improvement in
the method.65

In commenting about the proposed study by this investiga­
tor Dean Hoffman said:

Many additional studies need to be
done in the foods and nutrition field
as well as in the other subject areas

64May S. Bay, "An Experimental Study to Compare the
Individual Laboratory and Modified Demonstration Methods
for Teaching Food Preparation" (unpublished Master's

65Sasman, op. cit., p. 267.
in home economics in order for us to have sound answers to the questions regarding instructional methodology. The answers obtained through research will ultimately guide home economics administrators in making sounder decisions.66

66 Hoffman, op. cit., letter.
CHAPTER III

PROCEDURE IN COLLECTING THE DATA

This investigation was undertaken at the University of Vermont in the Home Economics Department, during the school year 1959-60. The investigator is the Chairman of the Home Economics Department at the University of Vermont. Part of her responsibility as chairman of the department is the resident instruction program. The aim of this program is to make the best use of the abilities and time of the students and staff, as well as to effectively allot to each teaching area its proportional share of the departmental budget.

Description of the Situation in Which the Data Were Obtained

The University of Vermont is located in a small city in a small state, Burlington, Vermont. The home economics students are made up of about 40% in-state students, and about 60% out-of-state students. In 1959-60 there were 127 students, 39 of whom were freshmen, in this department.

The sample from which the data were drawn comprised the 39 freshman majors in home economics. They were all
required to take the basic food course called **Survey of Food Preparation**, which is part of the core curriculum.

The curriculum committee is active, and experimentation on the part of the professional staff is encouraged. Since it was important to have the cooperation of the staff, the investigator reviewed and discussed with the food and nutrition staff the possibility that the much discussed demonstration method of teaching might or might not lend itself satisfactorily to the teaching of **Survey of Food Preparation**. The staff agreed that this would be a worthwhile investigation, and plans were made so that the experimentation could be undertaken.

Miss Blair Williams, Associate Professor and head of the teaching program of food and nutrition at the University of Vermont, was chosen to teach the experimental class. She is an excellent, well informed classroom instructor, and is able to do well both the laboratory and the demonstration method of teaching. The experiment was carried forward in room 307 Terrill Hall (The Home Economics Building).

**General Criteria**

In order to form equivalent experimental groups, homogeneity was given to as many factors as possible which might have an impact on the students' response to the learning situation.
They are as follows:

1. The survey of food preparation experimental groups were composed of an equal number of students matched in terms of the students':
   a. College Entrance Examination Board Scores.
   b. Spitzer Study Skills Test Scores.
   d. Brown-Carlsen Listening Comprehension Test Scores.
   e. High School home economics food experience.
   f. 4-H Club food projects completed.
   g. Home experience which was food connected.
   h. Employment experience which was food connected.

2. All students attended the same lecture.

3. Both experimental groups were taught by the same instructor.

4. Each matched group was taught 4 units of the course by the traditional manner of lecture plus individual laboratory participation, and 4 units by lecture plus lecture demonstration without individual participation. This was so determined in order to avoid the "halo" effect of one method being taught or liked better than the other.

5. The same method of evaluation was used regardless of the method by which the class was taught.

6. The "t" test was used to obtain as sharp a
difference as possible in determining the significance of difference as set up in the hypothesis.

Limitations of the Study

1. This study was carried out during only one school year, 1959-60.

2. Only freshman students in Home Economics at the University of Vermont were used in the study.

3. From the freshman students in Home Economics at the University of Vermont matched experimental groups were set up.

4. In this study one of the criteria for forming the experimental groups was the performance of the students as measured by academic ability and skill.

5. In this study one of the criteria for forming the experimental groups was the performance of the students as measured by acknowledged past experience in the preparation of food.

6. In this study the relative effectiveness of each teaching method, lecture demonstration and traditional laboratory, was based on the performance of the students in the experimental groups as measured by pre, post, and unit tests using curricular (content) validity.

7. There were 39 freshman students from which two matched groups were chosen. The size of the experimental
groups was fourteen students, limited by the laboratory space.

8. Because of the small size of the sample this study is considered to be a pilot study.

The Matching Procedure

Selecting the Measures

To provide two experimental groups with as great a degree of relevant similarity as possible different measures were used. These measures were of two types:

1. Measure of academic ability and skill
   a. Standard measures used as entrance requirements to the University, namely, the College Entrance Examination Board's Scholastic Aptitude tests of Verbal and Mathematical ability and the High School Rank.
   b. Tests given early in the first semester measuring a variety of academic skills were
      (1) Spitzer Study Skills.67
      (2) Watson-Glaser Critical Thinking Appraisal.68


(3) Brown-Carlsen Listening Comprehension.

2. Ratings by the investigator of the amount and kind of experience with food preparation a student had had in the following areas:

   a. Semesters of food preparation in high school home economics classes.
   b. Number of food-related projects in 4-H.
   c. Home experience in food preparation outside the home.
   d. Work experience related to food preparation.

Types of Score

The results of these various measures were expressed in different types of score. The tests were all in standard score form. The high school rank had been reduced to standard scores by the University Test Bureau. The ratings were simple ratings of the 1959-60 freshman students.


70 Appendix gives a sample of the record sheet used to obtain this data. (See pages 135 and 136.)
from which the experimental groups were chosen, and were not in standard form.\footnote{Appendix shows code and the assigned weights used in rating experience. No zero weights were used for arithmetical simplicity, and because most freshman students in home economics may be supposed to have had some sort of experience in this area. (See pages 137 and 138.)}

Combining the Scores

Two considerations seemed necessary and desirable in combining the scores. Insofar as possible the numerals should be small, and they should relate to the same base. The former was possible with both ratings and standard scores and the latter also with standard scores. The stanine developed during World War II is a well known standard score and a convenient nomograph was used to convert all the standard scores to stanines.\footnote{Test Service Bulletin No. 48 (New York: The Psychological Corporation, January, 1955), p. 6.}

Using these smaller numerals, the first three sets of averages were derived:

1. The Verbal and Mathematical scores of the CEEB scores with the High School rank.
2. The four pre-college experience ratings.
3. The three study skills tests.

These averages were averaged and rounded, resulting in a
set of scores ranging from a score of 3 at the low end to a score of 7 at the high end (Table 1).

Producing the Matched Groups

To produce two matched groups the students' names and their scores were typed on 3" by 5" cards. They were then segregated into piles of equal scores, all 7's together, all 6's together, etc. Each pile was shuffled and the students were assigned in turn from the top of the pack of cards down, to one or the other group. If, as did occur, an odd number of students was in the pack, the remaining student was assigned to instruction outside the experimental groups (Table 2).

Pre-Scheduling of Students in Experimental Groups

The students in experimental group "A" and the students in experimental group "B" were pre-scheduled by their advisor according to the section of Survey of Food Preparation to which they had been assigned. The schedules of these students were then taken to the registrar's office, and Mr. Collins, the enrolling officer, proceeded to pull each class card for each of the students in Section "A" and Section "B". This excluded any chance of an unmatched student being enrolled in either of these two sections. The third group "C", not an experimental section, also had
## Table 1

Component Scores of Students from Which the Matching Groups Were Drawn

<table>
<thead>
<tr>
<th>Code Number of Student</th>
<th>CEEB and High School Averages</th>
<th>Pre-College E. in F. F. Averages</th>
<th>Spitzer Watson-Glaser Brown-Carlsen Averages</th>
<th>Total Averages</th>
<th>Round Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.33</td>
<td>3.5</td>
<td>6.25</td>
<td>4.63</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
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<td>8.75</td>
<td>6.75</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>6.66</td>
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<td>4</td>
<td>5.75</td>
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<td>5.39</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6.66</td>
<td>3.5</td>
<td>8</td>
<td>5.97</td>
<td>6</td>
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<td>6</td>
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<td>5.25</td>
<td>4.36</td>
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<td>4</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>5.75</td>
<td>5.36</td>
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<tr>
<td>14</td>
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<td>5.36</td>
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<td>15</td>
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<td>5</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>5.75</td>
<td>2.75</td>
<td>5.75</td>
<td>3.94</td>
<td>4</td>
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<tr>
<td>17</td>
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<td>4.44</td>
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<td>4.75</td>
<td>5.75</td>
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<td>6</td>
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</table>
### Component Scores of Students From Which the Matching Groups Were Drawn

<table>
<thead>
<tr>
<th>Code Number of Student</th>
<th>CEEB and High School Averages</th>
<th>Pre-College E. in F. P. Averages</th>
<th>Spitzer Watson-Glaser Brown-Carlsen Averages</th>
<th>Total Averages</th>
<th>Round Averages</th>
</tr>
</thead>
<tbody>
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<td>21</td>
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<td>5.5</td>
<td>4.44</td>
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<td>3.55</td>
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<td>5</td>
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<td>3.97</td>
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<td>7</td>
<td>4.64</td>
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<tr>
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<td>4.05</td>
<td>4</td>
</tr>
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<td>6</td>
<td>4.99</td>
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<td>3.75</td>
<td>7</td>
<td>5.25</td>
<td>5</td>
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</tbody>
</table>
TABLE 2
MATCHED EXPERIMENTAL GROUPS FOR SURVEY OF FOOD PREPARATION

<table>
<thead>
<tr>
<th>Matching Score</th>
<th>Code Number of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Section &quot;A&quot;</td>
</tr>
<tr>
<td>6</td>
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<tr>
<td>6</td>
<td>20</td>
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<td>1</td>
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<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
</tr>
</tbody>
</table>
to be pre-scheduled, because they could not be put into one of the experimental groups, and as far as they or the other students knew, they were also a part of the experimental study. This set no one group of students apart from the other.

**Laboratory Schedule of Units**

Each experimental group did not have all laboratory or all demonstration for each unit. Half of the units were taught to Section "A" as Laboratory and half of the units were taught to Section "A" as Demonstration. Half of the units were taught to Section "B" as Laboratory and half to Section "B" as Demonstration. This was so designed in order to avoid the "halo" effect or variable of the instructor or student preferring one method of teaching over the other, therefore, both sections were taught part by the laboratory method and part by lecture demonstration (Table 3).

The following units were taught to both section "A" and section "B":

- Beverage Unit
- Starch Unit
- Fruit and Vegetable Unit
- Cheese Unit
- Egg and Milk Unit
TABLE 3
DISTRIBUTION OF LABORATORY TIME*

<table>
<thead>
<tr>
<th>Section &quot;A&quot;</th>
<th>Section &quot;B&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday - Thursday</td>
<td>Wednesday - Friday</td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
</tr>
<tr>
<td>Feb. 9</td>
<td>Introduction</td>
</tr>
<tr>
<td>11</td>
<td>Pre-test</td>
</tr>
<tr>
<td>16</td>
<td>Beverages</td>
</tr>
<tr>
<td>18</td>
<td>No class</td>
</tr>
<tr>
<td>23</td>
<td>Fruits (Dem.)</td>
</tr>
<tr>
<td>25</td>
<td>Vegetables (color &amp; texture) costs &amp; varieties</td>
</tr>
<tr>
<td>Mar. 1</td>
<td>Vegetables (methods of prep.)</td>
</tr>
<tr>
<td>3</td>
<td>Salads</td>
</tr>
<tr>
<td>8</td>
<td>No class</td>
</tr>
<tr>
<td>10</td>
<td>Starch cookery (cereals, cookery, cost comp. rice)</td>
</tr>
<tr>
<td>15</td>
<td>Starch cookery Thickening - reg. - quick - Pudding lemon sauce instant</td>
</tr>
<tr>
<td>17</td>
<td>Milk (cream soups garnishes)</td>
</tr>
<tr>
<td>22</td>
<td>Milk (kinds &amp; costs) Junket</td>
</tr>
<tr>
<td>24</td>
<td>Cheese souffle</td>
</tr>
<tr>
<td>29</td>
<td>Eggs (poached, omelet, custards, fruit whip)</td>
</tr>
<tr>
<td>31</td>
<td>No class</td>
</tr>
</tbody>
</table>

*All units shown within the boxes will be given as demonstrations.
## Table 3—Continued

### Distribution of Laboratory Time*

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section &quot;A&quot;</strong></td>
<td></td>
<td></td>
<td><strong>Section &quot;B&quot;</strong></td>
</tr>
<tr>
<td><strong>Tuesday - Thursday</strong></td>
<td></td>
<td></td>
<td><strong>Wednesday - Friday</strong></td>
</tr>
<tr>
<td><strong>Apr.</strong></td>
<td></td>
<td></td>
<td><strong>Apr.</strong></td>
</tr>
<tr>
<td>5</td>
<td>Meat (roasts, chops, etc.)</td>
<td>1</td>
<td>Eggs (custard, whips)</td>
</tr>
<tr>
<td>7</td>
<td>Meat (moist heat) swiss steak, stew, loaf, etc.)</td>
<td>6</td>
<td>Meat (Dry heat)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>Moist heat tenderizing</td>
</tr>
<tr>
<td>21</td>
<td>Meat extras</td>
<td>20</td>
<td>Meat extras</td>
</tr>
<tr>
<td>26</td>
<td>Poultry</td>
<td>22</td>
<td>No class</td>
</tr>
<tr>
<td>28</td>
<td>Fish</td>
<td>27</td>
<td>Poultry</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>29</td>
<td>Fish (Dem.)</td>
</tr>
<tr>
<td><strong>May</strong></td>
<td></td>
<td></td>
<td><strong>May</strong></td>
</tr>
<tr>
<td>3</td>
<td>Batters &amp; Doughs (Dem.) popovers, cr. puffs, compare costs of mix &amp; made</td>
<td>4</td>
<td>Batters &amp; Doughs - make popovers, cr. puffs, timbales &amp; calculate prices - comp. 2 mixes</td>
</tr>
<tr>
<td>5</td>
<td>Muffins with variations cost comparisons</td>
<td>6</td>
<td>Make muffins</td>
</tr>
<tr>
<td>10</td>
<td>Sponge type cakes make sponge - meringues (baked alaska)</td>
<td>11</td>
<td>Sponge cake - each make and meringues</td>
</tr>
<tr>
<td>12</td>
<td>Butter cakes - conventional vs. mix</td>
<td>13</td>
<td>Butter cakes - each make convent. group make mix &amp; cal. cost</td>
</tr>
<tr>
<td>17</td>
<td>Biscuits - regular &amp; variations</td>
<td>18</td>
<td>Biscuits - each make &amp; variations</td>
</tr>
<tr>
<td>19</td>
<td>Pies - demonstrate conventional method make and put together</td>
<td>20</td>
<td>Pies - each make</td>
</tr>
<tr>
<td>24</td>
<td>Deep fat frying doughnuts, croquettes, fish and timbale cases</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

*All units shown within the boxes will be given as demonstrations.*
Meat, Fish and Poultry Unit
Batters and Dough Unit
Deep Fat Fry Unit

Description of Laboratory

The laboratory experiments and the lecture demonstrations were carried out in the same classroom space, (Figure 1-8). The room had a display table with wheels mounted on the legs in the center of laboratory units, (Figure 1). This table was used for the demonstration table, (Figure 5). By pushing this display table to the far end of the space in the center of the laboratory units, 14 chairs were placed so that the demonstration table could be easily seen by each student, (Figure 5, 6). A large demonstration mirror was purchased to increase the ease with which each demonstration could be viewed, (Figure 7, 8).

A standard holding large sheets of paper which could be flipped over was a great help in making money management comparisons, etc. No other special properties were needed.

Both sections of the experimental groups met for two two-hour laboratory periods each week, and for one two-hour lecture period each week.
Illustrations Showing Laboratory Method of Teaching*

Fig. 1

Fig. 2

*These photographs were reproduced from an 8 mm. movie film.
Fig. 3

Fig. 4

*These photographs were reproduced from an 8 mm. movie film.
Method of Teaching *

*These photographs were reproduced from an 8 mm. movie film.
Illustrations Showing Lecture Demonstration
Method of Teaching *

Fig. 7

Fig. 8

*These photographs were reproduced from an 8 mm. movie film.
The Testing Procedure

Validity

There are no testing instruments which have been validated that are satisfactory for measuring the achievement of students in Survey of Food Preparation at the University of Vermont. Curricular (content) validity was used as a method to measure the validity of the test items used. The test items were taken from material presented in the class through lecture, laboratory instructions, demonstrations, or assigned reading material. Each item was rechecked to be sure the content had been presented to the class during the period over which the students were tested.

Some tests can be thought of as representative samples of performance in a defined class situation. If the total collection or "universe" is explicitly defined, the test construction can randomly sample from the collection to choose test items. The test is then regarded as having content [curricular] validity, since it manifestly represents the material that the test was intended to cover.73

When a teacher gives a test which deals with the material and to some

extent with the objectives of instruction in a particular class, his test is said to have curricular validity. It is common practice to give careful consideration to analyses of textbooks, course of study, and other instructional materials to insure that the tests will have curricular validity.74

The course content of Survey of Food Preparation is based upon the following objectives:

Objectives

1. To develop an understanding of the fundamental principles of food preparation.
2. To increase background information about food, its production, distribution, and preparation.
3. To establish a basis for the understanding and acceptance of desirable standards for food products.
4. To develop an awareness and appreciation of the wide variety of food available and its relation to nutritional value, home management, and equipment.
5. To develop an interest and appreciation of those tools and equipment best suited to specific kinds of food preparation.

6. To develop an understanding of the importance of money, time, and energy expenditure to food preparation.

7. To develop a food vocabulary.

8. To increase the appreciation of the relationship of food to our present day culture.

A course outline, lesson plans and other pertinent materials may be found in the Appendix, pages 139 to 166.

Tests

The same test items were given in the pre-test, unit tests, and post-test.

a. The pre-test, unit tests, and post-test measuring knowledge and principles of food preparation and management and equipment related to food-preparation. (See Appendix for instrument used.)

(1) A paper and pencil test.

(2) All test questions were the same in each instrument.

(3) The pre-test was administered first semester, the unit tests after each unit, and the post-test during final exam period.

b. A pre-test and post-test measuring the manipulative skills of food preparation, using
curricular validity. (See Appendix for instrument used, pages 186 to 191.)

(1) A practical laboratory test.

(2) The same five products were tested in the pre and post test.

(3) The pre-test was administered first semester, and the post-test was administered during final exam period.

The laboratory manual was reworked so that it would include money management related to food preparation as well as the food preparation instructions. (The laboratory manual may be had upon request from the Home Economics Department, University of Vermont, Burlington, Vermont.)

Test Items

The pre-test had two objectives. One, to give a basis for computing achievement, and two, to eliminate gross deficiencies in the inadequacies of directions to the examinee as well as ambiguities in the test items. The Bureau of Educational Testing at the University of Vermont checked the recommendations of the items to be removed from the pre-test. Dr. Huden said that the removal of these items would not invalidate the unit tests or the post-tests. The same test items were used for all
three tests. This removed any doubt of the reliability of test items measuring different achievements. The unit tests consisted of those items pertaining to a specific area of food preparation pulled from the post-test. The pre-test and post-test were identical except for those items removed as unsatisfactory from the pre-test.

The test items, in general, paralleled forms of tests already used previously in Survey of Food Preparation. The content and difficulty had been found satisfactory in previous forms.

Reliability of the Test Items

The evaluation of the reliability of a measuring instrument requires a determination of the consistency of repeated measurements of the same object or group of objects . . . In practice, therefore, all procedures of reliability estimation generally useful to psychology and education are based upon getting a small number of measurements, typically only two, for each individual in a representative group.75

A number of testing and statistical procedures are proposed to measure test reliability. The statistical procedure used in this study to measure the reliability

of the test was: "3. The subdivision of a single test into two presumably equivalent groups of items, each scored separately, and correlation of the resulting two scores."\(^7\) (See Table 4 for reliability coefficient.) The correlation was positive, .8329 at the 1 per cent level of significance.

If the correlation is larger than a \(\ast .4869\) or or less than a \(-.4869\) the two halves of the test are significantly related at the .01 level of significance. The number .8329 is larger than \(\ast .4869\), therefore the two halves of the test are significantly correlated.\(^7\)

In other words it is safe to say that it is 99 per cent sure that the two halves of the test are not unalike.

Measurement of the Relative Effectiveness of the Methods

This study has been designed to measure the difference in total achievement, as measured by a paper and pencil test and a practical laboratory test, between two methods of teaching food preparation as well as management and equipment related to food preparation. The two methods

\(^7\)Ibid., p. 575.

**TABLE 4**

RELIABILITY OF THE PAPER AND PENCIL SURVEY OF FOOD PREPARATION TEST BY CORRELATION OF THE COEFFICIENT OF THE TWO TEST HALVES

<table>
<thead>
<tr>
<th>Test</th>
<th>Number</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Half</td>
<td>26</td>
<td>10.18</td>
<td>98.27</td>
</tr>
<tr>
<td>2nd Half</td>
<td>26</td>
<td>11.03</td>
<td>93.46</td>
</tr>
</tbody>
</table>

Correlation .8329
compared were traditional laboratory and lecture demonstration. The Home Economics Department at the University of Vermont defines these two terms as follows:

The laboratory experience in basic food preparation includes the giving of directions by the instructor about the product or products which are to be made by each student or by a student and her partner. The student then proceeds to make the product. After the product or products have been made they are evaluated by the class and the instructor.

The lecture demonstration differs from the laboratory in that all the activity is carried on by the instructor. The students observe the demonstration of the product or products by the instructor. She lectures as she demonstrates. The students may ask questions concerning the product or products any time during the demonstration. The finished products are evaluated by the class and the instructor.

Measuring Instruments for Study

Paper and Pencil Tests

During the first semester the pre-test was given in Orientation class to each freshman student. The subject matter was divided into 8 units. After each unit a test was given except for the Batters and Dough and the French
Fry Units, because it did not seem wise to give a unit test so close to the final exam period. A post-test was given during the final examination period.

The test items were first made up as unit tests. Then the items were combined to make up the pre-test, divided again into unit tests, and then combined again finally for the post-test. The test had sufficient items (derived after consultation with the University of Vermont Educational Testing Bureau) so that the students would not be aware that they were asked the same questions three times. The investigator and the instructor found no indication that any student was aware of being measured by the repetition of test items. (See post-test in Appendix, pp. 157 to 185.) The correct scores for the three sets of each test item were tabulated and totaled according to the teaching method the student had for each unit.

The aim of this study is not to develop a test instrument, but to use these test scores in order to ascertain total achievement so the relative effectiveness of teaching by the traditional laboratory or by the lecture demonstration method can be measured.

The Practical Test

Each student participating in the study took a practical (to demonstrate manipulative proficiency)
pre-test and post-test in the laboratory. The student wrote directions and evidenced her ability to prepare five representative products chosen by the instructor (see practical test, Appendix, pp. 186 to 191.) The instructor evaluated all the products of each student. The results were tabulated in the same way as for the paper and pencil test.

Evaluation

Each student in the study was asked to evaluate the Survey of Food Preparation Course. No formal instrument was used by the class, this was a subjective measure. The results were tabulated.

Changes in the Study

One student in Group A dropped school before the end of the semester. To keep the experimental groups as alike as possible, a student from Group B with the same matching score was excluded from the study. Each experimental group had 13 students in the class (Table 3).

Statistical Treatment

Dr. John Huden, Head of the Educational Testing Bureau at the University of Vermont, concluded that the best approach to the difference-of-means as outlined in
Garrett's book, *Statistics in Psychology and Education*, was by the reliability of the difference between means in small independent samples. (See Appendix, pages 192 to 195.)

In summary two groups of freshman students were formed using certain criteria. The students were taught, according to units, either by the laboratory or the lecture demonstration method of teaching. All students took the same paper and pencil and practical achievement tests. An analysis of the data obtained appears in Chapter IV which follows.

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CHAPTER IV

RESULTS

The primary concern of the study was to determine if the null hypotheses could be confirmed or rejected.

Hypotheses

Hypothesis I

There will be no significant difference between the mean scores of freshman students who are taught basic concepts of food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently being used in the Home Economics Department at the University of Vermont as measured by the current test using curricular (content) validity.

Hypotheses II through IX

There will be no significant difference between the mean scores of freshman students who are taught the basic concepts of food preparation in the beverage unit, fruit and vegetable unit, starch and milk unit.
hypothesis X

There will be no significant difference between the mean scores of freshman students who are taught basic management and equipment concepts related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current curricular (content) validity.

Hypothesis XI

There will be no significant difference between the mean scores of freshman students who are taught basic
concepts of money and time management as related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.

Hypothesis XII

There will be no significant difference between the mean scores of freshman students who are taught basic concepts of equipment as related to food preparation through a lecture demonstration method and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit test using curricular (content) validity.

Hypothesis XIII

There will be no significant difference between the mean scores of freshman students who are taught the practical application of basic food preparation through a lecture demonstration and the mean scores of students taught by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit test using curricular (content)
validity. To ascertain this, data collected by testing the students in both experimental groups were analyzed.

Performance of the Two Experimental Groups in the Units for Survey of Food Preparation

The performance of the students in the laboratory group and the lecture demonstration group for all subject matter units were arranged in a frequency distribution.

The mean and standard deviation were computed for both experimental groups of each subject matter unit. No statistically significant difference at the 5 per cent level between the means of the students in the laboratory or the students in the lecture demonstration was found except in the Starch and Milk Unit. The Starch and Milk Unit was slightly significant with a higher mean for the lecture demonstration method. The Starch and Milk Unit, however, was not significant at the 1 per cent level. For the analysis of differences see Tables 5 through 12, pp. 89 to 96.

From these results it is concluded that the null hypotheses II through IX are sustained.

It is interesting to note that although there is no significant difference the mean score of the meat, the fish and poultry unit, the fruit and vegetable unit, and the egg unit is slightly higher for those students in the lecture demonstration group. However, for the batters and
# Table 5

**Analysis of the Difference of Means on Paper and Pencil Scores for Students Participating in Laboratory or Lecture Demonstration for Testing the Beverage Unit**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>13</td>
<td>18-31</td>
<td>3.76</td>
<td>25.00</td>
</tr>
<tr>
<td>Lecture Demonstration</td>
<td>13</td>
<td>18-32</td>
<td>3.785</td>
<td>25.23</td>
</tr>
</tbody>
</table>

\[ df = 24 \]

Calculated \( t \) = 0.1637

\( t = 2.06 \) at the .05 level .

\( t = 2.60 \) at the .01 level .

not significant
<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>13</td>
<td>39-66</td>
<td>6.871</td>
<td>51.89</td>
<td>24</td>
</tr>
<tr>
<td>Lecture Demonstration</td>
<td>13</td>
<td>45-64</td>
<td>6.149</td>
<td>57.1b</td>
<td></td>
</tr>
</tbody>
</table>

calculated \( t = 2.043 \)

\( t = 2.06 \) at \( .05 \) level ·*· not significant

\( t = 2.80 \) at \( .01 \) level ·*· not significant
TABLE 7

ANALYSIS OF THE DIFFERENCE OF MEANS ON PAPER AND PENCIL SCORES FOR STUDENTS PARTICIPATING IN LABORATORY OR LECTURE DEMONSTRATION FOR TESTING THE STARCH AND MILK UNIT

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory A</td>
<td>13</td>
<td>21-52</td>
<td>7.650</td>
<td>40.92</td>
</tr>
<tr>
<td>Lecture Demonstration B</td>
<td>13</td>
<td>33-59</td>
<td>7.513</td>
<td>48.15</td>
</tr>
</tbody>
</table>

\[ df = 24 \]

\[ \text{calculated } t = 2.397 \]

\[ t = 2.06 \text{ at } .05 \text{ level of significance} \]

\[ t = 2.80 \text{ at } .01 \text{ level of significance} \]

not significant
### TABLE 8

ANALYSIS OF THE DIFFERENCE OF MEANS ON PAPER AND PENCIL SCORES FOR STUDENTS PARTICIPATING IN LABORATORY OR LECTURE DEMONSTRATION FOR TESTING THE CHEESE UNIT

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>13</td>
<td>12-23</td>
<td>3.527</td>
<td>19.00</td>
</tr>
<tr>
<td>Lecture Demonstration</td>
<td>13</td>
<td>15-26</td>
<td>3.508</td>
<td>19.85</td>
</tr>
</tbody>
</table>

\[ df = 24 \]

Calculated \[ t = 0.6076 \]

\[ t = 2.06 \text{ at } .05 \text{ level}. \text{ not significant} \]

\[ t = 2.80 \text{ at } .01 \text{ level}. \text{ not significant} \]
### Table 9

**Analysis of the Difference of Means on Paper and Pencil Scores for Students Participating in Laboratory or Lecture Demonstration for Testing the Egg Unit**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>13</td>
<td>27-47</td>
<td>6.070</td>
<td>38.62</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>13</td>
<td>31-46</td>
<td>4.444</td>
<td>39.31</td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( df = 24 \)

Calculated \( t = 0.3259 \)

\( t = 2.06 \) at .05 level • not significant

\( t = 2.80 \) at .01 level • not significant
**TABLE 10**

**ANALYSIS OF THE DIFFERENCE OF MEANS ON PAPER AND PENCIL SCORES FOR STUDENTS PARTICIPATING IN LABORATORY OR LECTURE DEMONSTRATION FOR TESTING THE MEAT, FISH AND POULTRY UNIT**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory A</td>
<td>13</td>
<td>52-77</td>
<td>7.969</td>
<td>64.85</td>
</tr>
<tr>
<td>Lecture Demonstration B</td>
<td>13</td>
<td>55-102</td>
<td>12.46</td>
<td>70.85</td>
</tr>
</tbody>
</table>

\[ df = 24 \]

\[ \text{calculated } t = 1.443 \]

\[ t = 2.06 \text{ at the .05 level } \] not significant

\[ t = 2.80 \text{ at the .01 level } \] not significant
<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory B</td>
<td>13</td>
<td>61-95</td>
<td>8.685</td>
<td>79.54</td>
</tr>
<tr>
<td>Lecture Demonstration A</td>
<td>13</td>
<td>65-96</td>
<td>8.215</td>
<td>77.69</td>
</tr>
</tbody>
</table>

df = 24

calculated $t = 0.5359$

$t = 2.06$ at .05 level .* not significant

$t = 2.30$ at .01 level .* not significant
<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean ( \bar{X} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory B</td>
<td>13</td>
<td>15-23</td>
<td>2.304</td>
<td>19.00</td>
</tr>
<tr>
<td>Lecture Demonstration A</td>
<td>13</td>
<td>14-27</td>
<td>4.057</td>
<td>20.00</td>
</tr>
</tbody>
</table>

\( df = 24 \)

Calculated \( t = 0.7424 \)

\( t = 2.06 \) at .05 level, not significant

\( t = 2.80 \) at .01 level, not significant
dough unit the mean score is slightly higher for those students in the laboratory group.

**Total Performance of the Students in the Laboratory Versus the Lecture Demonstration in Survey of Food Preparation**

The total achievement scores for the students in the laboratory group and the lecture demonstration group was arranged in a frequency distribution. The range of raw scores for the total of laboratory groups was from 12 to 95. The range of raw scores for the total of the lecture demonstration groups was from 14 to 102.

The mean and standard deviation were computed for each group. For the laboratory group the mean was 58.15; the standard deviation was 21.10. For the lecture demonstration group the mean was 54.25, and the standard deviation was 23.11. No statistically significant difference at the 5 per cent level between the means of students in the laboratory or the lecture demonstration group was found since the calculated $t$ equaled 0.6346 with 206 degrees of freedom (Table 13).

From these results it is concluded that the null hypothesis $I$ is sustained.

This sample is small, and it is dangerous to make any broad generalizations, but it is interesting to note
## Table 13

**Analysis of the Difference of Means on Paper and Pencil Total Scores for Students Participating in Laboratory or Lecture Demonstration**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 units X 13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td>104</td>
<td>12-95</td>
<td>21.63</td>
<td>42.47</td>
</tr>
<tr>
<td>A and B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture Demonstration</td>
<td>104</td>
<td>14-102</td>
<td>22.23</td>
<td>44.56</td>
</tr>
<tr>
<td>A and B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*used 200*

\[ df = 206 \]

*calculated \( t = 0.6846 \)*

*\( t = 1.97 \) at the .05 level .*. not significant*

*\( t = 2.60 \) at the .01 level .*. not significant*
that again the mean score is slightly higher for the lecture demonstration method.

**Performance of the Students in Laboratory Versus Lecture Demonstration for the Achievement in Management and Equipment of Survey of Food Preparation**

**The Management Section**

The total achievement scores for the students in the laboratory and the lecture demonstration group was arranged in a frequency distribution. The range of raw scores for management achievement for the laboratory group was from 10 to 46. The range of raw scores for the management achievement for the lecture demonstration group was from 8 to 46.

The mean and standard deviation were computed for each group. For the laboratory group the mean was 26.38, and the standard deviation was 12.75. For the lecture demonstration group the mean was 26.46, and the standard deviation was 12.97. No statistically significant difference at the 5 per cent level between the means of students in the laboratory or lecture demonstration group was found since the calculated $t$ equaled 0.0219 with 50 degrees of freedom (Table 14).

From these results it is concluded that the null hypothesis XI is sustained.
### TABLE 14

**ANALYSIS OF THE DIFFERENCE OF MEANS ON PAPER AND PENCIL SCORES FOR STUDENTS PARTICIPATING IN LABORATORY OR LECTURE DEMONSTRATION TESTING MANAGEMENT KNOWLEDGE AND PRINCIPLES**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory A and B</td>
<td>26</td>
<td>10-46</td>
<td>12.75</td>
<td>26.38</td>
</tr>
<tr>
<td>Lecture Demonstration A and B</td>
<td>26</td>
<td>8-46</td>
<td>12.97</td>
<td>26.46</td>
</tr>
</tbody>
</table>

\[ df = 50 \]

Calculated \( t = 0.0219 \)

\( t = 2.01 \) at .05 level . . not significant

\( t = 3.68 \) at .01 level . . not significant
The total achievement scores for the students in the laboratory and the lecture demonstration group were arranged in a frequency distribution. The range of raw scores for equipment achievement for the laboratory group was from 16 to 28. The range of raw scores for the equipment achievement for the lecture demonstration group was from 11 to 20.

The mean and standard deviation were computed for each group. For the laboratory group the mean was 23.04 and the standard deviation 2.488. For the lecture demonstration group the mean was 15.73, and the standard deviation 2.030. This demonstrated that there was a statistically significant difference at both the 5 per cent and the 1 per cent level between the means of students in the laboratory versus the students in the lecture demonstration group since the calculated t equaled 11.32 with 50 degrees of freedom (Table 15).

From these results it is concluded that the null hypothesis XII is rejected in favor of the laboratory method of teaching equipment.
## Table 16

**Analysis of the Difference of Means on Paper and Pencil Scores for Students Participating in Laboratory or Lecture Demonstration Testing Equipment Knowledge and Principles**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory A and B</td>
<td>26</td>
<td>16-28</td>
<td>2.488</td>
<td>25.04</td>
</tr>
<tr>
<td>Lecture Demonstration A and B</td>
<td>26</td>
<td>11-20</td>
<td>2.030</td>
<td>15.73</td>
</tr>
</tbody>
</table>

\[ df = 50 \]

\[ \text{calculated } t = 11.32 \]

\[ t = 2.01 \text{ at .05 level .*. significant} \]

\[ t = 2.68 \text{ at .01 level .** significant} \]
Total Management and Equipment Section

The total achievement scores for management and equipment of the students in the laboratory and the lecture demonstration groups were arranged in a frequency distribution. The range of raw scores for management and equipment achievement for the laboratory group was from 10 to 46. The range of raw scores for the management and equipment achievement for the lecture demonstration group was from 8 to 46.

The mean and standard deviation were computed for each group. For the laboratory group the mean was 24.71, the standard deviation 9.440. For the lecture demonstration group the mean was 21.10, the standard deviation 10.72. No statistically significant difference at the 5 per cent level between the means of students in the laboratory or lecture demonstration group was found since the calculated t equaled 1.805 with 102 degrees of freedom (Table 16).

From these results it is concluded that the null hypothesis X is sustained. The mean score for this section is slightly higher for the laboratory method.
# TABLE 16

**ANALYSIS OF THE DIFFERENCE OF MEANS ON PAPER AND PENCIL SCORES FOR STUDENTS PARTICIPATING IN LABORATORY OR LECTURE DEMONSTRATION TESTING MANAGEMENT AND EQUIPMENT KNOWLEDGE AND PRINCIPLES**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>26</td>
<td>10-46</td>
<td>9.440</td>
<td>24.71</td>
</tr>
<tr>
<td>A and B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>26</td>
<td>8-46</td>
<td>10.72</td>
<td>21.10</td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A and B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*used 100*

df = 102

calculated $t = 1.805$

$t = 1.98$ at .05 level * not significant

$t = 2.63$ at .01 level * not significant
Performance of the Students in the Laboratory
Versus Lecture Demonstration for Evidenced
Achievement in the Practical Survey
of Food Preparation Test

The total achievement scores for the students in
the laboratory and the lecture demonstration group were
arranged in a frequency distribution. The range of raw
scores for the practical right scores for students having
the test items in laboratory was from 17 to 107. The range
of raw scores for the practical right scores for students
having the test items in lecture demonstration was from
10 to 96.

The mean and standard deviation were computed for
each group. For the laboratory group the mean was 58.15,
the standard deviation 21.10. For the lecture demonstra-
tion group the mean was 54.23, the standard deviation
23.11. No statistically significant difference at the
5 per cent level between the means of students having had
the items by laboratory or lecture demonstration was found
since the calculated t equaled 0.6260 with 50 degrees of
freedom (Table 17).

From these results it is concluded that the null
hypothesis XIII is sustained. The mean score is slightly
higher for the laboratory method.
TABLE 17
ANALYSIS OF THE DIFFERENCE OF MEANS ON THE PRACTICAL TEST SCORES FOR STUDENTS PARTICIPATING IN LABORATORY VERSUS STUDENTS WHO HAD LECTURE DEMONSTRATION AS A METHOD OF TEACHING

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory A and B</td>
<td>26</td>
<td>17-107</td>
<td>21.10</td>
<td>58.15</td>
</tr>
<tr>
<td>Lecture Demonstration A and B</td>
<td>26</td>
<td>10-96</td>
<td>23.11</td>
<td>54.23</td>
</tr>
</tbody>
</table>

\[ df = 50 \]
\[ \text{calculated } t = 0.6260 \]
\[ t < 2.01 \text{ at .05 level } .^* \text{ not significant} \]
\[ t < 2.68 \text{ at .01 level } .^* \text{ not significant} \]
Performance of the Students in Section A Versus Section B for Evidenced Achievement of the Total Survey of Food Preparation Score

This investigator wished to test the total performance of one matched section versus the other in order to see if one group achieved to a significantly greater degree than the other.

Paper and Pencil Test

The total achievement scores for the students in Section A and Section B were arranged in a frequency distribution. The range of raw scores for the paper and pencil test right scores for the students in Section A was from 12 to 96. The range of raw scores for the paper and pencil test right scores for the students in Section B was from 15 to 102.

The mean and standard deviation were computed for each group. For Section A the mean was 42.90, the standard deviation 21.19. For Section B the mean was 44.15, the standard deviation 22.57. No statistically significant difference at the 5 per cent level between the means of students in Section A and students in Section B was found since the calculated t equaled 0.4318 with 206 degrees of freedom (Table 18).

From these results it is concluded that there is no statistically significant difference in the performance
### Table 18

**Analysis of the Difference of Means of the Paper and Pencil Scores for Students in Section A versus Section B**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean $\bar{x}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>26</td>
<td>12-96</td>
<td>21.19</td>
<td>42.90</td>
</tr>
<tr>
<td>Section B</td>
<td>26</td>
<td>15-102</td>
<td>22.57</td>
<td>44.15</td>
</tr>
</tbody>
</table>

**used 200**

$df = 206$

calculated $t = 0.4318$

$t = 1.97$ at .05 level . . not significant

$t = 2.60$ at .01 level . . not significant
of Section A versus Section B on the paper and pencil test given for Survey of Food Preparation.

**The Practical Laboratory Test**

The total achievement scores for the students in Section A and Section B were arranged in a frequency distribution. The range of raw scores for the practical test for the students in Section A was from 12 to 77. The range of raw scores for the practical test for students in Section B was from 16 to 102.

The mean and standard deviation were computed for each group. For Section A the mean was 117.31, the standard deviation 21.20. For Section B the mean was 119.62, the standard deviation 22.01. There is no statistically significant difference at the 5 per cent level between the means for students in Section A or Section B since the calculated $t$ equaled 0.2747 with 50 degrees of freedom (Table 19).

From these results it is concluded that there is not a statistically significant difference in the performance of Section A versus Section B on the practical laboratory test given for Survey of Food Preparation.
TABLE 19

ANALYSIS OF THE DIFFERENCES OF MEANS OF THE PRACTICAL TEST SCORES FOR STUDENTS PARTICIPATING IN SECTION A VERSUS SECTION B

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Raw Scores</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>15</td>
<td>12-77</td>
<td>21.20</td>
<td>117.31</td>
</tr>
<tr>
<td>Section B</td>
<td>15</td>
<td>16-102</td>
<td>22.01</td>
<td>119.62</td>
</tr>
</tbody>
</table>

\[ df = 50 \]

Calculated \( t = 0.2747 \)

\( t = 1.97 \) at .05 level ** not significant

\( t = 2.60 \) at .01 level ** not significant
The Evaluation of the Two Methods by the Students and the Instructor

An additional aspect of the study was the evaluation of the two methods of teaching by the students and the instructor. This was a subjective measure, and no attempt was made to formalize the pattern of the response.

Student Evaluation

The opinions of the students were tabulated according to the method of teaching preferred in teaching Survey of Food Preparation. The combination of the laboratory and the lecture demonstration was preferred by more students, 50 per cent, than either of the two methods alone (Table 20). As one student said, "I believe that this is the ideal way of teaching a food preparation course, because the omission of either one would mean a person misses a great deal."

This investigator felt that some of the comments most often repeated are related to the successful teaching of a basic food preparation course. Some representative statements of the students are quoted in the following tables, Table 21 and Table 22.
### TABLE 20

PREFERENCE OF CLASSROOM TEACHING METHOD
BY LABORATORY SECTION

<table>
<thead>
<tr>
<th>Laboratory Section</th>
<th>Preferred Laboratory</th>
<th>Preferred Lecture Demonstration</th>
<th>Preferred Combination</th>
<th>Undecided</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
</tr>
<tr>
<td>A</td>
<td>15</td>
<td>4</td>
<td>30.76</td>
<td>3</td>
<td>25.07</td>
</tr>
<tr>
<td>B</td>
<td>15</td>
<td>3</td>
<td>23.00</td>
<td>2</td>
<td>15.50</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>7</td>
<td>26.92</td>
<td>5</td>
<td>15.38</td>
</tr>
</tbody>
</table>
TABLE 21

REPRESENTATIVE STATEMENTS FROM STUDENT EVALUATIONS

<table>
<thead>
<tr>
<th>Laboratory Participation</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &quot;The regular laboratory is better for such things as batters and doughs, because it is important to get the feel of the product and what you are doing.&quot;</td>
<td>&quot;You only learn to prepare the dish assigned to you in the laboratory.&quot;</td>
<td></td>
</tr>
<tr>
<td>2. &quot;When we made mistakes in the conventional laboratory this made us see why certain techniques are important, and you profit from your own mistakes.&quot;</td>
<td>&quot;I found that I knew less of what I was doing, because the 'why' was not always answered.&quot;</td>
<td></td>
</tr>
<tr>
<td>3. &quot;Only in the conventional laboratory could I really see and understand how things were done.&quot;</td>
<td>&quot;Usually, I was so busy attending to the food which I was preparing that I didn't really have a chance to see how other foods were prepared.&quot;</td>
<td></td>
</tr>
<tr>
<td>4. &quot;I feel more secure after a do-it-yourself laboratory, and it is more fun.&quot;</td>
<td>&quot;When we do the work ourselves, we follow the directions but don't know what the actual principles are.&quot;</td>
<td></td>
</tr>
<tr>
<td>5. &quot;There is nothing more satisfactory than the experience of making the food itself. I like the practical application because it is more fun.&quot;</td>
<td>&quot;We have a tendency to hurry just so we can be done on time.&quot;</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 21—Continued

REPRESENTATIVE STATEMENTS FROM STUDENT EVALUATIONS

<table>
<thead>
<tr>
<th>Laboratory Participation</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. &quot;I think having a partner is a great help, because you can compare your products and discuss the methods together.&quot;</td>
<td>&quot;One of the major things I disliked about the laboratory was the doubling up to do one product. I never seemed to learn that way, as everyone seemed to get into each other's way, and one person did most of the work.&quot;</td>
<td></td>
</tr>
<tr>
<td>7. &quot;Some time saving devices such as sectioning an orange you need to actually do. I don't believe I would use such a method just watching it done, but by having my own orange, I learned.&quot;</td>
<td>&quot;I feel I didn't learn as much or enough because I was confused and didn't know what I was doing all the time.&quot;</td>
<td></td>
</tr>
<tr>
<td>8. &quot;The traditional laboratory allows the student a chance to organize the procedure and clean-up process as well as giving a sense of responsibility and satisfaction.&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 22

REPRESENTATIVE STATEMENTS FROM STUDENT EVALUATIONS

Lecture Demonstration

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  &quot;The demonstration laboratory is good because the student is able to</td>
<td>&quot;I believe that the short talks and explanations before the laboratory are</td>
</tr>
<tr>
<td>take notes and listen and see the correct methods and principles of</td>
<td>enough and could take the place of the demonstrations.&quot;</td>
</tr>
<tr>
<td>preparing several dishes, whereas working separately I was only</td>
<td></td>
</tr>
<tr>
<td>aware of the one method I was using. When you prepare foods</td>
<td></td>
</tr>
<tr>
<td>individually you miss all kinds of information you need to learn.&quot;</td>
<td></td>
</tr>
<tr>
<td>2.  &quot;The demonstration was especially valuable when comparing such things</td>
<td>&quot;You did not have an opportunity to learn by your own mistakes in the</td>
</tr>
<tr>
<td>as acid, base, and pure water, because I don't think we would have</td>
<td>demonstration.&quot;</td>
</tr>
<tr>
<td>noticed these differences if we were busy trying to cook a product.</td>
<td></td>
</tr>
<tr>
<td>This was true for other foods as well.&quot;</td>
<td></td>
</tr>
<tr>
<td>3.  &quot;I feel that when we are studying some difficult principle the</td>
<td>&quot;I felt that it was tiring to sit so still and watch so carefully for so</td>
</tr>
<tr>
<td>demonstration is essential.&quot;</td>
<td>long a time.&quot;</td>
</tr>
<tr>
<td>4.  &quot;The instructor is able to work faster and with more proficiency, and</td>
<td>&quot;I believe we should have shorter demonstrations more often.&quot;</td>
</tr>
<tr>
<td>you are able to learn better techniques as well as the principles</td>
<td></td>
</tr>
<tr>
<td>behind the different reactions as they are happening.&quot;</td>
<td></td>
</tr>
</tbody>
</table>
### Lecture Demonstration

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. &quot;Fundamentals can be taught in less time, and the students profit from seeing an experienced person handle the foods. We can ask questions, and the instructor answers them at any point in the demonstration.&quot;</td>
<td>&quot;You can't get the feel of a product in a demonstration, especially something like batters and doughs.&quot;</td>
</tr>
<tr>
<td>6. &quot;In the demonstrations you are able to receive many valuable hints and suggestions for serving the dishes, as well as explaining the principles more completely, more details about food preparation are brought out.&quot;</td>
<td>&quot;You do not remember techniques as well when only seeing them in the demonstration.&quot;</td>
</tr>
<tr>
<td>7. &quot;Demonstrations have the advantage of showing how things should be done the right way, you were able to see what a standard product looked like.&quot;</td>
<td>&quot;The demonstration is not as much fun.&quot;</td>
</tr>
</tbody>
</table>
| 8. "The demonstrator gives out more time-saving and money tips than the instructor of a conventional laboratory could. The same material is presented in a shorter period of time than the conventional laboratory." |"
From the statements made by the students certain observations can be made.

1. There are certain intrinsic values that students gain from laboratory experience:
   a. greater satisfaction in the course
   b. a feeling of how to make the product
   c. it is more fun
   d. a greater sense of security in the course

2. There are strengths which appear to be particularly characteristic of the lecture demonstration experience:
   a. professed better understanding of knowledge, techniques, and principles
   b. learning about more products in a shorter time
   c. better understanding of the more complex relationships in basic food preparation
   d. gives greater opportunity to ask questions and know the "why" of food preparation

The Instructor's Evaluation

This investigator would like to mention at this time that the third laboratory, section C, including all the unmatched students, was taught only by lecture demonstration except for three free laboratories (free meaning
the attendance was self-initiated). Although this section was not part of the experimental group, the instructor preferred this method of teaching, because she felt that it was an excellent compromise between the two experimental methods.

The following statements summarize the evaluation of the instructor on the teaching of Survey of Food Preparation for the spring semester 1960.

**Advantages of Teaching by Lecture Demonstration**

1. The instructor is able to cover more information, principles, and techniques.

2. The students are more attentive during the lecture demonstration laboratories.

3. The students ask more questions about basic food principles, and they are apparently more interested in learning the "why."

4. It is much less costly to teach by the lecture demonstration method. The equivalent of one laboratory plus the three self-initiated laboratories were taught in the traditional manner, therefore the equivalent of two laboratories were taught by lecture demonstration. The Home Economics Department saved about $550 to $600 on food costs through this experiment.
Disadvantages of Teaching by Lecture Demonstration

1. It is difficult to cover all the products made in the regular laboratory in less than one and one-half hour.

2. The housekeeping standards were very low for the group having only lecture demonstration.

3. It took from 10 to 12 hours to prepare for each demonstration.

4. The professional appearance, when participating in the laboratory, of the girls having only lecture demonstration was very lax.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS
FOR FURTHER RESEARCH

Summary

The following summary indicates the scope, experimental design, and results of the findings of this investigation.

Problem

To compare the relative effectiveness of two teaching methods, individual laboratory and lecture demonstration, in teaching the freshman course Survey of Food Preparation to two matched experimental groups in the Home Economics Department at the University of Vermont.

Experimental Design

Two sections, 15 each, of freshman home economics students at the University of Vermont formed the experimental groups A and B. These sections were taught basic food preparation by laboratory method and by lecture demonstration method.

The two sections were matched by specified measures.
of academic ability and skill, as well as pre-college food preparation experience. In order to rule out as many variables as possible both groups had the same lecture, instructor, number of food preparation units, number of class periods, and laboratory space. The students were taught by subject matter units. They all took the same paper and pencil, and the same practical application test, measuring content validity. A statistical procedure was used to test the data obtained. This procedure tested the difference of means, and is known as the t-test. The two methods of teaching were also subjectively evaluated by each student and the instructor. These evaluations were summarized.

Results

Laboratory Versus Lecture Demonstration Method of Teaching for the Total Course Content

The null Hypothesis I was confirmed: there was no significant difference between the mean scores of freshman students who are taught basic concepts of food preparation through a lecture demonstration method or by the laboratory method currently being used in the Home Economics Department at the University of Vermont as measured by the current test using curricular (content) validity.
The mean score was slightly higher for the lecture demonstration group.

Laboratory Versus Lecture Demonstration Method of Teaching for Each Unit of Course Content

The null Hypotheses II, III, and V through IX were confirmed: there was no significant difference between the mean scores of freshman students who are taught the beverage, fruit and vegetable, cheese, egg, meat, batter and dough, and deep fat units of basic concepts of food preparation through a lecture demonstration method or by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.

The null Hypothesis II was rejected at the 5 per cent level and confirmed at the 1 per cent level: there was no significant difference between the mean scores of freshman students who are taught the starch and milk unit of basic concepts of food preparation through the lecture demonstration method or by the laboratory method currently being used in the Home Economics Department at the University of Vermont as measured by curricular (content) validity. The difference of means for the starch and milk unit was significant in favor of the lecture demonstration method only at the 5 per cent level.
The implication of these results of the data obtained for the eight subject matter units seems to indicate that within the limitations of this sample, the differences are not great enough to be significant.

Laboratory Versus Lecture Demonstration Method of Teaching for the Management and Equipment Test Items

The null Hypothesis I was confirmed: there was no significant difference between the mean scores of freshman students who are taught basic management and equipment concepts related to food preparation through a lecture demonstration method or by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by curricular (content) validity.

The mean score was slightly higher for those students having covered the material over the test items by the laboratory method.

The null Hypothesis XI was confirmed: there was no significant difference between the mean scores of freshman students who are taught basic concepts of money, time, and energy management as related to food preparation through a lecture demonstration or by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.
The mean score was slightly higher for those students who had covered the material over the test items by lecture demonstration.

The null Hypothesis XII was rejected: there was a significant difference between the mean scores of freshman students who are taught basic concepts of equipment as related to food preparation through a lecture demonstration method or by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current tests using curricular (content) validity.

The mean score was significantly higher for the laboratory group who were taught equipment as related to food preparation.

**Laboratory Versus Lecture Demonstration Method of Teaching for the Practical Application of Basic Food Preparation**

The null Hypothesis XIII was confirmed: there was no significant difference between the mean scores of freshman students who are taught the practical application of basic food preparation through lecture demonstration or by the laboratory method currently used in the Home Economics Department at the University of Vermont as measured by the current unit tests using curricular (content) validity.
The mean score was slightly higher for those students who prepared items which they had prepared in the laboratory than for those students who prepared items which they watched prepared in the lecture demonstration.

Evaluation of the Laboratory Versus Lecture Demonstration by the Students and the Instructor

The two methods of teaching were evaluated by the students and the instructor. This was a subjective essay form of measurement.

The students and the instructor preferred the combination of the laboratory and lecture demonstration rather than either one of the two methods alone.

From the statements made by the students the following observations can be made:

1. There are certain intrinsic values that students gain from laboratory experience, namely:

   a. greater personal satisfaction
   b. greater sense of security
   c. a "feel" of how to make a product
   d. it is "more fun"
2. There are certain strengths that seem to be particularly characteristic of the lecture demonstration experience, namely:
   a. they believed they gained a better grasp in understanding knowledge, principles, and techniques of food preparation
   b. they believed they learned about more products in a shorter time
   c. they believed they gained a better understanding of the more complex relationships of food preparation
   d. they believed they had a greater opportunity to ask questions and become more aware of the "why" of food preparation

From the evaluation made by the instructor the following observations can be made:

1. There are certain advantages gained through teaching by lecture demonstration method of teaching, namely:
   a. it is possible to cover more information, principles, and techniques in a shorter period of time
   b. students are more attentive during lecture demonstration periods
c. students ask more basic questions about food principles
d. the lecture demonstration is much less costly to operate

2. There are certain disadvantages when using the lecture demonstration method of teaching, namely:
   a. students must sit for at least an hour and a half in order to cover all products made in the regular laboratory
   b. housekeeping standards were lower when students had class by the lecture demonstration method
   c. it took from 10 - 12 hours to prepare for each lecture demonstration
   d. professional appearance in the laboratory was lax for students in lecture demonstration section

Synopsis

Hypotheses I through XIII were confirmed at the 5 per cent level of significance save for two exceptions. There was a significant difference in the mean scores of the Starch and Milk Unit in favor of the lecture demonstration method of teaching at the 5 per cent level. There was, however, no significant difference in the mean
scores of the Starch and Milk Unit at the 1 per cent level. The other exception was the difference in mean scores of the test items covering equipment as related to food preparation. The difference of means was significant at both the 1 per cent and the 5 per cent level of significance in favor of the laboratory method of teaching.

The students and the instructor preferred the combination of the laboratory and lecture demonstration rather than either one of the two methods alone.

**Conclusions and Implications**

**Conclusions**

Within the limitations of the experimental design of this study the following statements seem to the investigator to summarize the conclusions of the findings.

1. From the findings of this study it would seem that there is no significant difference between the laboratory and lecture demonstration method of teaching basic concepts of food preparation to students at the University of Vermont. Students did not learn more through one teaching method than the other one.

2. Basic concepts of food preparation can be taught effectively by more than one method; the laboratory method is not the only way.
3. Manipulative skills are not taught in the Survey of Food Preparation course at the University of Vermont; there was no significant difference in the practical test between those students who did have and those who did not have laboratory experience in preparing certain foods in basic food preparation. Only a "feel" of the product was evidenced as peculiar to the laboratory method through the evaluation by the students.

4. Students indicated that they gained a depth of understanding basic food principles, the "why," from the lecture demonstration that was not evidenced in the evaluation of the laboratory experience.

5. Students indicated that there were intrinsic values received from the laboratory experience, such as satisfaction in the performance of a task and a sense of security, which were not evidenced in the evaluation of the lecture demonstration.

6. The students and the instructor indicated in the evaluation that a lecture demonstration method of teaching with a self initiated laboratory would seem to be a very good compromise between the two methods.

7. The amount of money saved by teaching the Survey of Food Preparation course by lecture demonstration is a significant factor in light of the rising costs of education.
Implications

1. More colleges and universities should take a careful look at their goals and objectives and consider the methods they use to teach all of the food preparation courses. The results of this study indicate that careful consideration should be given to teaching the basic food preparation course by lecture demonstration or by the combination of the lecture demonstration and laboratory methods.

2. Serious consideration should be given to devising some way of teaching manipulative skills which is not at the expense of classroom time, such as:
   
a. Supervised experience, but self initiated by the student. The student would be held responsible for all the work covered, but would be free to go to as many or as few of the scheduled laboratory periods for which there was a felt need.

b. It would seem that about four free period laboratories should be sufficient. They should be scheduled as part of the regular course.

3. A self-guided experience, the student's responsibility, would help develop the "feel," a sense of value and respect for the acquisition of manipulative skills in food preparation.
4. Larger sections of students could be taught as effectively by the lecture demonstration method or by the combination of the two methods.

5. To be successful in teaching a course involving the lecture demonstration method of teaching basic food preparation the instructor should be an accomplished teacher demonstrator.

**Recommendations for Further Research**

The following hypotheses are recommended in light of the preceding experimental study. It is hoped that some of them are already being seriously considered or being tested by home economics research workers.

1. The further exploration of the hypotheses of this study will reinforce those observations and conclusions made upon the basis of the experimental evidence of this pilot study.

2. There will be no significant difference in the retention of subject matter content in, advanced food preparation classes, by students who were taught basic food preparation by the laboratory method of teaching and by students who were taught basic food preparation by the lecture demonstration method of teaching.

3. There will be no significant difference between the mean scores of students who are taught by the lecture demonstration method of teaching and by the mean scores
of students who are taught by the laboratory method of teaching in each area of home economics now being taught by the traditional laboratory method of teaching. (It would be well if this could be tested in more than one home economics program.)

4. The achievement level of students in basic home economics courses, as indicated by valid pre-tests, will ascertain the need for taking these courses or going on to more advanced course work.

5. There are methods of teaching more appropriate at one college level than at another for teaching courses now being taught by the traditional laboratory method. The method of teaching and the degree of depth needed may be ascertained by experimentally designed studies.

6. Manipulative skills as now taught in the basic home economics laboratory courses do implement professional success in home economics.

7. Educators may be unaware of valid conclusions drawn from evidence now available of completed experimental results about teaching methods in home economics. These studies should be summarized and brought to the attention of the profession.

This investigator believes that it is time to put into practice valid experimental results, and that an
effort should be made to shorten the length of time between
changes in educational practice and theory.

If home economists in higher education are to meet
the challenges of the times, they must have a spirit of
adventure, the courage of their convictions, and the
vision to see beyond the horizons.
PRE-COLLEGE EXPERIENCE IN FOOD PREPARATION

1. Name

2. Anticipated Major

3. How much food preparation did you take in high school home economics?

<table>
<thead>
<tr>
<th>Grade</th>
<th>Semester</th>
<th>Semesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ninth Grade</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tenth Grade</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Eleventh Grade</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Twelfth Grade</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. How much 4-H Club food preparation have you had?

<table>
<thead>
<tr>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>More than 4 projects</td>
</tr>
</tbody>
</table>

5. How much food preparation have you had responsibility for at home?

<table>
<thead>
<tr>
<th>Meals</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial</td>
<td>1</td>
</tr>
<tr>
<td>Full</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>
6. Have you had employment that would give you a better understanding of food preparation? ________ None
   ________ Summer ________ Waitress
   ________ Part-Time ________ Kitchen Help
   Other (Explain) __________________________

7. Have you had any other experience which you feel would be helpful in giving a better understanding of food preparation?
   ________ No
   ________ Yes (Explain) __________________________
**Pre-College Experience in Food Preparation**

<table>
<thead>
<tr>
<th>High School</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - None</td>
<td>1 - Other</td>
<td></td>
</tr>
<tr>
<td>2 - 1 Semester</td>
<td>3 - 2 Semesters</td>
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<tr>
<td>4 - 3 Semesters</td>
<td>5 - 4 Semesters</td>
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<tr>
<td>6 - 5-6 Semesters</td>
<td>7 - 7-8 Semesters</td>
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<table>
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<tr>
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<tbody>
<tr>
<td>1 - None</td>
<td>2 - 1-2 Projects</td>
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<td>3 - 3-5 Projects</td>
<td>4 - 6-8 Projects</td>
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<table>
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<th>At Home</th>
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<tbody>
<tr>
<td>1 - None</td>
<td>2 - Other</td>
<td></td>
</tr>
<tr>
<td>3 - Partial Meals, 1-2 Years</td>
<td>4 - Partial Meals, 3-4 Years</td>
<td></td>
</tr>
<tr>
<td>5 - Full Meals, 1-2 Years</td>
<td>6 - Full Meals, 3-4 Years</td>
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Scores given only for full meals if student has done both part and full meals.

<table>
<thead>
<tr>
<th>Employment</th>
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<tbody>
<tr>
<td>1 - None</td>
<td>1 - Other</td>
<td></td>
</tr>
<tr>
<td>2 - Summer, Waitress</td>
<td>2 - Part-time Waitress</td>
<td></td>
</tr>
<tr>
<td>3 - Summer, Kitchen Help</td>
<td>5 - Part-time Kitchen Help</td>
<td></td>
</tr>
</tbody>
</table>

2 others = 2 points
Summer and part-time = 3 points

---

1 Final score given arbitrary weight of three times the original score.

2 Final score given arbitrary weight of two times the original score.
College Entrance Examination Board Scores

Verbal - V) Equivalent Stanine Scores 1-9, Test Service Bulletin No. 48, The Psychological Corporation, January, 1955, p. 5, 4, 8, 6

5Spitzer Study Skills


6Watson-Glaser Critical Thinking Appraisal


5Brown-Carlsen Listening Comprehension Test


6Another derivative of the general standard score system is the stanine plan, developed by psychologists in the Air Force during the war. The plan divides the norm population into nine groups, hence, "standard nines." Except for stanine 9, the top, and stanine 1, the bottom, these groups are spaced in half-sigma units. Thus, stanine 5 is defined as including the people who are within ±0.25σ of the mean. Stanine 6 is the group defined by the half-sigma distance on the baseline between ±0.25σ and ±0.75σ. Stanines 1 and 9 include all persons who are below -1.75σ and above +1.75σ, respectively. The result is a distribution in which the mean is 5.0 and the standard deviation is 2.0. (Test Service Bulletin No. 48, The Psychological Corporation, January, 1955, p. 7).
SURVEY OF FOOD PREPARATION LABORATORY

Credits: 4

Class Hours: 1-two hour lecture per week
2- two hour laboratory periods per week

Lecture Demonstration and Laboratory Lesson Outline

Unit I Beverages

Lecture Demonstration Method

Discussion of principles of solution in relation to desired products.

Show samples of different types of tea and prepare one.

Prepare ice tea and demonstrate the clearing of cloudy ice tea.

Demonstrate the different types of coffee makers discussing principles of each.

Prepare coffee by one method.

Discuss care of coffee makers.

Prepare hot chocolate emphasizing
Scalding milk
Cooking chocolate and water
Heating to form foam

Show charts of comparative costs of tea, coffee, chocolate and cocoa per serving for types available.

Laboratory Method

Discussion of principles of solution in relation to desired products.

Types of coffee makers, advantages and principles of each, care of equipment.

Principles of milk cooking in scalding milk and heating to form foam.

Each girl prepare:

Coffee—assigning types of coffee makers in groups of 3.

Cocoa or chocolate

Group of 3 prepare tea using different types, e.g., green, oolong, black, spiced.

Discuss and exhibit types of tea, coffee, chocolate and cocoa.

Calculate the cost of a serving from each (e.g., instant, regular, etc.). One girl assigned to each.

Exhibit materials on bulletin board.

Unit II Fruits and Vegetables

Fruits

Lecture Demonstration Method

Discuss display of fruits.

Discuss small equipment.

Prepare:

Stewed apple

Applesauce
Baked apple
Broiled grapefruit

Show:
Sectioning of orange and grapefruit
Cutting of melon balls
Preparation of pineapple
Sugaring grapes
Prevention of browning in fruits

Compare costs:
Orange juice; fresh, frozen, canned.
Fruit cup; fresh, frozen, canned.
Base comparison on:
Cost of 4 oz. serving
Ascorbic acid content

Laboratory Method

Discuss display of fruits.
Discuss small equipment.
Demonstration of sectioning oranges, cutting melon balls, sugaring grapes, preparing pineapple, and prevention of browning.

In groups of 3:
One girl prepare applesauce, one stewed apples.
Each girl prepare baked apple, varying the center filling.
Each girl prepare a fresh fruit cup and determine cost of 4 oz. serving for comparison with canned and frozen fruit cup.
Vegetables

Lecture Demonstration Method

Discuss display of vegetables.
Discuss and show effect of acid on pan materials.

Prepare:
- Cabbage and onions
- Pressure sauce panned beans
- Potatoes
- Artichokes
- Asparagus; frozen, fresh, and canned

Show:
- How cooking losses occur
- Changes in cellulose
- Changes in plant pigments
- Effect of cooking upon flavor
- Effect of cooking on vegetable protein

Compare costs:
- Fresh, frozen, and canned peas
- Fresh and frozen broccoli

Laboratory Method

Discuss display of vegetables, discuss briefly changes occurring in vegetables during cooking, and vitamin losses.

Discuss effect of acids on pan materials.

In groups of 3:
- One girl prepare sulphur-containing vegetable
One girl prepare dried legume

One girl prepare vegetable showing changes in carbohydrate

In groups of 3:

One girl steam a vegetable

One girl prepare a frozen green vegetable

One girl prepare a canned vegetable

Each girl prepare a fresh green vegetable as well as prepare and compare the cost of it with the same frozen and canned vegetable.

Unit III Starch Cookery and Milk
Starch

Lecture Demonstration Method

Methods of combining starch or starchy foods with hot liquid. Comparison of viscosity and clarity of corn, wheat, potato, and tapioca.

Prepare:

Cornstarch pudding. Compare with mixes as to cost and time.

Lemon sauce

Some puddings prepared ahead to show variation in serving.

Laboratory Method

Group assignment for methods of combining and variation in types of starch products. Class discussion of results.

Each student prepare corn starch pudding.

Each group of two prepare lemon sauce.

Groups compare cost of puddings; made and mix.
Lecture Demonstration Method

White sauce—cereal cookery.

Prepare rice ring and set in oven.

Compare types of rice in cost and preparation time.

Discuss cooking of rice and macaroni products.

Prepare white sauce and serve as:

Creamed tuna

Cheese sauce on rice ring

Serve precooked chicken to show thickening of chicken stock.

Laboratory Method

Each girl make 1 cup cream sauce and combine with fish, egg and cheese or chicken.

Each group of two cook 1 cup rice by different methods and mold in ring. Serve with creamed food. One group use minute rice, one brown rice.

Group discussion of price comparisons and nutrient value.

Milk

Lecture Demonstration Method

Comparison of types of milk, cost and nutrient value. Whole, dry, evaporated, condensed, buttermilk and yogert.

Demonstrate cream soups—show use of blender for pureeing.
Prepare:

- Cream of spinach
- Cream of potato
- Cream of tomato

Show types of garnishes to use on soups:

- Croutons, toasted almonds, riced egg yolks, whipped cream, popcorn, crisp bacon, etc.

Prepare a rennet custard and compare with package mix. Time and cost.

Laboratory Method

- Each girl prepare one serving of cream soup and garnish appropriately.
- Each girl prepare ½ slice bread as croutons.
- Group discussion.
- Each girl prepare rennet custard.
- Taste and figure cost of types of milk. Compare for nutritive value and cost.

Unit IV Cheese

Lecture Demonstration Method

- Prepare cheese souffle. Have one already cooking.
- Discuss principles of cheese cookery.
- Discuss types of cheese and relative cost.
- Serve souffle and cheese tray.
Laboratory Method

Each girl prepare a cheese souffle (one egg).

Group discussion of types of cheese, cost variations.

Sample varieties supplied.

Unit V Eggs

Lecture Demonstration Method

Selection of eggs for freshness, cost comparison related to size. Choice of grade for use.

Demonstrate poached egg and plain omelet, foamy omelet.

Prepare soft and baked custard (have baked custard prepared ahead).

Laboratory Method

Discussion as for lecture demonstration method.

Each girl prepare poached egg on toast, plain omelet.

In groups prepare one of the following:

Hard cooked egg
Fried egg
Scrambled egg
Foamy omelet

Each girl prepare a baked custard and a soft custard.
Unit VI  Meat, Fish, Poultry and Gelatin

Lecture Demonstration Method

Discuss time management in relation to preparation of meat, fish and poultry.

Discuss the use and care of the range.

Meat

Tender cuts.

Prepare roast ahead to have ready for class.

Prepare roast ready for oven.

Broil different steaks, sirloin, tenderloin and rib.

Pan broil chops.

Oven bake pork chops.

Less tender cuts.

Prepare ahead: Pot roast, flank steak, swiss steak.

Prepare in class for cooking: Pot roast, flank steak, swiss steak, stew, beef loaf.

Pan broil cube steak.

Discuss cuts used and methods of tenderizing.

Meat Extras.

Prepare ahead:

Tongue

Heart braised (also show preparation for stuffing)
Prepare in class:

Broiled loin
Creamed sweetbreads in toast cups
Broiled kidneys

Poultry

Prepare a roasting chicken ready to cook.
Prepare and cook broiled chicken and fried chicken.
Prepare and cook ahead a fowl for fricasse. (cook fowl in pressure saucepan)

Fish

Prepare and cook stuffed baked fish.
Prepare breaded pan fried fillet of sole and of haddock.
Broil swordfish steak.
Steam cod for creaming.
Boil a lobster.
Cook shrimp and show preparation.

Laboratory Method

Discuss time management in relation to preparation of meat, fish and poultry.

Discuss the use and care of the range.
Meat

Tender cuts.

Have a roast cooking.
One group prepare roast for oven.
One group broil sirloin steak.
One group rib steak.
One group a tenderloin steak.
Panbroil chops (two groups).
Oven bake pork chops (two groups).

Less tender cuts.

Have pot roast cooking.
As a group stuff and roll flank steak.
One group prepare meat loaf.
One group prepare swiss steak.
One group prepare stew.
One group prepare veal cutlet.

Meat Extras.

Have ready to serve "broiled" tongue and braised stuffed heart.

Prepare as a group stuffed heart ready to cook.

Every other two girls prepare broiled liver (calves).

Every other two girls prepare pan fried loin (beef) with bacon.

Groups of two make kidney stew or creamed sweetbreads.
Poultry

As a group prepare roaster for oven.
Group of two prepare fried chicken or broiled chicken.
As a group finish preparation of precooked fowl for fricasse (cook in pressure sauce pan).

Fish

Two girls prepare pan fried fillet of sole.
Two girls prepare pan fried fillet of haddock.
Two girls broil salmon or swordfish steak.
Two girls prepare shrimp and cream.
As a group prepare baked stuffed fish and broiled lobster. Also steam fish for creaming.

Gelatin

Lecture Demonstration Method
Prepare before class: Bavarian cream and Spanish cream, chill for serving.
Prepare in class and chill in ice and salt:
Plain orange gelatin and commercial mix (compare for cost and nutritive value)
Fruited gelatin
Whipped gelatin
Snow pudding
Prepare Bavarian and Spanish cream for later chilling.
Laboratory Method

Each girl prepare plain gelatin, then:

Three make fruited gelatin
Three whipped gelatin
Three snow pudding
Three plain and compare with package mix

Two groups make Bavarian cream.
Two groups make Spanish cream.

Chill all mixtures in ice and salt.

Unit VII Batter and Doughs

Lecture Demonstration Method

Discuss and show use and care of equipment giving the best results in making batters and doughs.

Discuss time and energy involved in making batters and doughs.

Batters

Pour Batters.

Prepare ahead filling for cream puffs.

Before class (3/4 hour) make and start baking:

Popover mix
Cream puff mix
During class prepare:

Popovers
Cream puffs
Waffles

Compare cost of mixes with made products and cost of frozen ready to serve waffles with mixes and made waffles.

Drop Batters. Muffins and Quickbreads.

Prepare in class:

Plain muffins
Corn muffins
Banana bread

Prepare banana bread ahead for serving.

Show series of muffins baked after different amounts of mixing.

Cakes.

Prepare ahead: sponge cake, conventional cake. Have ready for serving.

Prepare in class:

Sponge cake
Conventional cake
Cake mix

Compare mix and conventional cake, cost, time, quality.
Doughs

Prepare in class baking powder biscuits.
Prepare pastry and bake as single crust.
Have lemon filling ready and make meringue.

Laboratory Method

Discuss the use and care of equipment used in preparing batters and doughs.

Discuss time and energy involved in making batters and doughs.

Limited discussion about pour batters, drop batters, cakes and doughs.

Batters

Pour Batters. In groups of 3:
One girl prepare popovers or mix.
One girl prepare cream puffs or mix.
One girl prepare waffles or mix.

Drop Batters. In groups of 3:
One girl prepare plain muffins or mix.
One girl prepare corn muffins or mix.
One girl prepare banana bread or mix.

Cakes. In groups of 3:
One girl prepare sponge cake.
One girl prepare conventional cake.
One girl prepare cake mix.
Doughs

Each girl make baking powder biscuits.
Each girl make single pie crust.

Unit VIII Deep Fat Frying

Lecture Demonstration Method

Prepare in class the following:

Timbale cases, serve with some creamed food to show use, discuss irons.

Fruit fritters

Fried shrimp

Meat croquettes, have croquettes mixture ready to mold and coat with egg and crumbs.

Laboratory Method

Discuss care and use of timbale irons.

Working in groups prepare:

Timbale cases

Fruit fritters

Fried shrimp

Doughnuts

Croquettes
LECTURE SCHEDULE
FOR SURVEY OF FOOD PREPARATION
1960

1. Introduction: Sociological and cultural inter-
relationships. Early man, food gatherer; man the
food producer. Present problems and technological
developments. Objectives of the course in food
preparation. (Chap. 1, Hughes; VHEA Handbook, p.18)

2. Solutions: Physical and chemical importance of water as
a solvent in food preparation. Types of solutions.
Beverages: Tea, coffee, chocolate, cocoa.
(Chap. 9, Hughes)

Importance of plants to man.

4. Fruits and Vegetables: Classification, parts of plant
used, changes in plant tissues during preparation.
(Chap. 3, Chap. 11, Hughes)

5. Cereals and Starch cookery: General structure of
grains, principles of starch cookery. (pp. 261-278,
Hughes)

6. Proteins: Structure and properties in relation to heat
and pH.

8. Structure of egg, production and handling of eggs. Effect of heat, salts and pH on egg protein. Uses of egg in food preparation. (Chap. 4, Hughes)


12. Sugars and Sirups; (pp. 235-243, Hughes)

13. Flours and Leavening agents: (Chap. 14, Hughes)

14. Fats and Oils: (Chap. 10, Hughes)

15. Food Adjuncts
NOTE: The following tests do not include all of the evaluative instruments used in the course. Only those tests over food preparation and pertinent to this study are appended.
1. Following are seven cuts of beef. Place the number of the cut (or section of cut) under the appropriate cost level. Repeat placing numbers under the cooking methods that might be satisfactorily employed for each cut or section.

<table>
<thead>
<tr>
<th>Cost Level</th>
<th>Cooking Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Broil</td>
</tr>
<tr>
<td>Medium</td>
<td>Roast</td>
</tr>
<tr>
<td>Low</td>
<td>Stew</td>
</tr>
<tr>
<td></td>
<td>Pot Roast</td>
</tr>
<tr>
<td></td>
<td>Braise</td>
</tr>
</tbody>
</table>

![Diagram of beef cuts and descriptions of muscle, fat, and bone]
2. When making sauces and gravies which are thickened with starch, the starch granules must be separated to ensure a smooth product. List the three ways by which this separation may be accomplished.

A. 
B. 
C. 

3. Milk should be heated in a double boiler because:

A. There is less loss by evaporation.
B. There is less loss of calcium.
C. This method prevents scum formation on the surface.

4. The best contact temperature in making tea at sea level is:

A. 212° F
B. 198° F
C. 95° F
D. 214.6° F

5. Which of the following methods of cooking may cause considerable loss of food value in vegetables? Check your choices.

A. Baking
B. Steaming
C. Addition of baking soda to cooking water.
D. Cooking in small amount of water.
E. Preparing and soaking to crisp before cooking.
6. In making lemon sauce the lemon juice should be added after the starch has been cooked - if added during the cooking period,

A. the flavor is lost.
B. hydrolysis of starch takes place.
C. the sauce will be less sweet.
D. the sauce does not thicken satisfactorily.

7. When making a dessert which you wish to mold and turn out which would you use?

A. Tapioca.
B. Cornstarch.

8. When selecting chicken for roasting which of the following could you choose?

A. Capon.
B. Fowl, meaty with good fat deposits.
C. Pullet.
D. Cook.

9. Salad greens may be crisped by which of the following methods?

A. Soaking in salted water.
B. Placing in dry container in the refrigerator until ready for use.
C. Washing and storing in tightly closed container in refrigerator.
D. Chilling in iced water.
10. Which of the following could you select for deep fat frying?

- A. Corn oil.
- B. Olive oil.
- C. Butter.
- D. Hydrogenated shortening.

11. Briefly describe each of the following.

Croquette.

Timbale case.

12. With respect to cost per serving which one of the following pairs would you choose?

- A. Popover mix.
- B. Homemade chocolate cake.
- C. Angel cake mix.
- D. Commercial frozen coffee cake.
13. Fish is more readily over cooked than meat due to which of the following:

A. The amount of protein.
B. The amount of connective tissue.
C. The amount of fat.
D. The amount of bone.

14. The change in the structure of an egg-milk mixture, such as soft custard, when the temperature progresses beyond the coagulation point is called:

A. Caramelizeation.
B. Curdling.
C. Gelatinization.
D. Hydration.

15. Mark the most perishable item in each of the following pairs.

A. Tenderloin steak.
B. Flounder fillet (fresh).
C. Shell fish.

16. In thickening a fruit dessert when it was important to retain the clear fruit color which of the following would you use?

A. Tapioca.
B. Cornstarch.
C. Flour.
17. In making cornstarch pudding in an aluminum double boiler check which one you would use.

A. A wooden spoon.
B. A metal spoon.
C. Give a brief reason for your choice. ___________

18. Percolated coffee contains:

A. More tannin than drip type.
B. Less tannin than drip type.
C. No difference.

19. Which of the following would be a good test for the doneness of a butter cake?

A. Golden brown crust.
B. Crack thru the center.
C. Springs back when lightly touched by finger.
D. Cake tester comes out clean from center.
E. Cooking time is correct as given in recipe.

20. Select the correct term in list "B" which best describes the principal function of egg in each of the products given in list "A".

<table>
<thead>
<tr>
<th>List A (Products)</th>
<th>List B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mayonnaise</td>
<td>1 - Thickening agent</td>
</tr>
<tr>
<td>B. Lemon Snow</td>
<td>2 - Foaming agent</td>
</tr>
<tr>
<td>Pudding</td>
<td></td>
</tr>
<tr>
<td>C. Chocolate</td>
<td>3 - Emulsifying agent</td>
</tr>
<tr>
<td>Custard</td>
<td></td>
</tr>
</tbody>
</table>
21. The greatest amount of coffee flavor (caffeeol) is obtained by which of the following methods:

__________________________A. Percolator.
__________________________B. Vacuum pot.
__________________________C. Drip.
__________________________D. Steeped.
__________________________E. Boiled.

22. When milk is heated some of the nutrient value may be lost. To minimize this, which of the following would you use?

__________________________A. Steamer.
__________________________B. Copper bottom sauce pan.
__________________________C. Covered aluminum sauce pan.
__________________________D. Double boiler.

23. In planning ahead for a speedy breakfast, which of these procedures would you avoid?

__________________________A. Place equipment and supplies for coffee making together by the range.
__________________________B. Measure the water and coffee, place in coffee maker and put on range.
__________________________C. Place coffee in coffee maker close to water but do not measure water until following morning.
24. A budget saving practice in food preparation using milk would be to substitute the following for whole milk. Place a number in each box, 1 representing the greatest saving, 2 the next best and 3 the least saving.

_________________________ A. Reconstituted evaporated milk.
_________________________ B. Reconstituted skim milk.
_________________________ C. Fresh skim milk.

25. In making butter cake using the conventional method of mixing, the fat and sugar are combined by which of the following methods?

_________________________ A. Beating.
_________________________ B. Creaming.
_________________________ C. Cutting.
_________________________ D. Folding.
_________________________ E. Stirring.

26. Cornstarch, sugar, milk and flavoring are used in making blanc mange. Briefly list the steps in combining ingredients and in the method of cookery.

A.
B.
C.
D.
E.

27. If you were primarily concerned with time and energy rather than minimum cost in meal planning which of the following practices would you select as wise, in consideration of your objective and the nutrient value of the food served? In each paired group select the practice you feel has the greater value.
A. Instant mashed potato.

B. Regular potatoes, cooked and mashed.

C. Packaged prepared coleslaw.

B. Home prepared coleslaw.

C. Baked potatoes.

C. Frozen potato patties.

28. Considering time and energy in relation to the homemaker that has full time employment outside the home which of the following do you feel would be best in saving time and energy?

A. Popovers.

B. Cream puffs.

C. Muffin mix.

29. You are to make 1 cup of medium white sauce. Fill in the quantity of each ingredient listed below.

A. Milk.

B. Flour.

C. Fat.

D. Salt.

30. A family on a low income is buying 32 quarts of skim milk per week. Actually, to meet the recommended needs for this family, they should be using 54 quarts of milk per week. How could this be remedied without upsetting the budget?
31. When a muffin has a smooth, shiny crust and is peaked in shape showing large holes in the interior, the cause is undoubtedly due to which of the following?

A. Excess sugar.
B. Excess fat.
C. Excess stirring.
D. Inadequate baking powder.

32. The cost of drip grind coffee is 79 cents per pound. Each pound contains approximately 5 cups. If 2 tablespoons per 8 ounce cup of water are used, what will be the cost per serving?

A. Cost per serving.

33. Certain of the following soups may curdle when allowed to stand due to tannins present in the vegetables. Place an "X" on the line to the left of those items in which this may happen.

A. Asparagus.
B. Tomato.
C. Celery.
D. Carrot.

34. In the right hand column are listed various baked products. In the left hand column are listed leavening agents. Place the letter representing each product in the appropriate space under leavening agents.

<table>
<thead>
<tr>
<th>Leavening Agents</th>
<th>Baked Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbondioxide</td>
<td>(a) Sponge cake</td>
</tr>
<tr>
<td></td>
<td>(b) Muffins</td>
</tr>
<tr>
<td>Steam</td>
<td>(c) Ginger bread</td>
</tr>
<tr>
<td></td>
<td>(d) Cream puffs</td>
</tr>
<tr>
<td>Air</td>
<td>(e) Yeast bread</td>
</tr>
<tr>
<td></td>
<td>(f) Baking powder biscuits</td>
</tr>
<tr>
<td></td>
<td>(g) Sour milk griddle cakes</td>
</tr>
</tbody>
</table>
35. If you were on a limited budget which would you select?

______________ A. Bulk tea.
______________ B. Tea bags.
______________ C. Instant tea.

36. In selecting a pan for cooking vegetables check any which you feel are "unsafe."

______________ A. Cast iron.
______________ B. Aluminum.
______________ C. Stainless steel.
______________ D. Glass.

37. Popovers are most satisfactorily baked in which of the following?

______________ A. Heavy glass custard cups.
______________ B. Heavy iron pans.
______________ C. Tin pans.
______________ D. Aluminum pans.

38. Milk may be solidified by the addition of the enzyme rennin. The temperature of the milk when rennin is added should be:

______________ A. 20° C
______________ B. 40° C
______________ C. 80° C
______________ D. 100° C

39. When making baked custard which of the following would you not select?

______________ A. Heavy pottery containers.
______________ B. Metal containers.
______________ C. Pyrex containers.
40. Baked products may be classified as: (a) pour batters (b) drop batters (c) soft doughs or (d) stiff doughs. Place the letter which correctly describes the type better for each of the following, to the left of the product.

A. Popovers.  
B. Pastry.  
C. Baking powder biscuits.  
D. Waffles.  
E. Bread.  
F. Cream puffs.  
G. Pancakes.  
H. Muffins.

41. In beating egg whites for a foamy omelet which container would you select when using a rotary type hand beater?

A. Large, flat bowl to provide wide surface area for maximum incorporation of air.  
B. Deep, fairly straight sided bowl.  
C. Deep, rounded bottom bowl.

42. In baking cake, the pan should be placed in which of the following positions?

A. Lower shelf.  
B. Middle shelf.  
C. Top shelf.

43. When preparing mashed potatoes which of the following combinations would you use when combining the mashed potato with milk and butter?
A. Aluminum cooking pan.

B. Aluminum cooking pan.

C. Makes no difference.

44. The cost of tea per cup prepared at home compared to coffee is:

A. More.

B. Less.

C. No difference.

45. All purpose flour differs from cake flour in which of the following characteristics?

A. Cake flour has less starch than all purpose flour.

B. Cake flour has more starch than all purpose flour.

C. Cake flour has more gluten than all purpose flour.

D. Cake flour has less gluten than all purpose flour.

E. Cake flour absorbs more water than all purpose flour.

F. Cake flour absorbs less water than all purpose flour.

46. Factors which interfere with the formation of a curd in junket are:

A.

B.
47. In combining cheese with white sauce which of the following practices would you advise for melting the cheese?

____________________A. Grate and melt in the upper part of a double boiler, add white sauce and stir to blend.

____________________B. Grate, combine with white sauce, bring rapidly to a boil. Cook for 1 minute.

____________________C. Grate, combine with white sauce and cook in double boiler.

48. When baking is complete how should each of the following products be handled?

_____________________ Muffins

_____________________ Sponge Cake

_____________________ Butter Cake

49. To retain the best color without loss of nutrient value when cooking green vegetables which of the following would you select?

____________________A. Tightly covered pan throughout cooking period.

____________________B. Addition of a very small amount of baking soda to the water.

____________________C. Acidifying the water with a small amount of vinegar.

____________________D. Cook in open pan for a few minutes then cover and complete cooking.
50. In making cream of tomato soup would you:

A. Heat the tomato puree and add cold milk?

B. Heat both the tomato and the milk and combine by pouring the milk into the tomato?

C. Heat the milk and add the cold tomato?

D. Heat the milk and the tomato and combine by pouring the milk into the tomato?

E. Thicken the tomato and add the hot milk?

F. Thicken the tomato and add it to the hot milk?

51. List the following cheeses in order of cost per pound: cheddar, blue, roquefort, grated parmesan, cottage.

A.

B.

C.

D.

E.

52. What happens to food in deep fat frying when the fat is too hot?

A. It will be mushy.

B. It will brown before cooking through.

C. It will become soaked with fat.

D. It will be dry and crumbly.
53. When making pancakes or waffles which of the following would you use to produce leavening?

A. Beaten egg whites.  
B. Quick acting baking powder.  
C. Double acting baking powder.  
D. Sweet milk and baking powder.

54. A young homemaker finds that there is a difference of several cents in the price of eggs at the local store. She is concerned with getting the best nutrition value for her money. In each of the following situations which would you consider her "best" buy? Place the letter which reflects your choice to the left. If neither is satisfactory leave blank.

A. Brown eggs (a) cost less than white eggs.  
B. She is doing considerable baking. Should she use grade A, B, or C?  
C. She serves her husband a poached egg each morning for breakfast. Should she serve grade A or B or C?  
D. (Large eggs cost 75¢ per dozen.) She is planning to serve scrambled eggs at a supper party. Should she buy the large eggs (A) or the small eggs (B)?

55. Which of the following would you select if you wanted to be sure to have a smooth, homogeneous cheese sauce?

A. Young, mild cheese.  
B. Aged cheese.  
C. Processed cheese.
56. A well made butter cake using the conventional method of mixing has certain desirable characteristics not obtained in mixes. However, making such a cake demands skill. Listed below are some of the common failures. Match the reasons which explain the failures by placing the proper numbers in the spaces provided.

<table>
<thead>
<tr>
<th>Failures</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Cake falls 1. Cake baked too long.</td>
<td></td>
</tr>
<tr>
<td>B. Tunnels and large holes 3. Excess flour.</td>
<td>4. Excess fat.</td>
</tr>
<tr>
<td>C. Crust cracks and center is peaked. 7. Excess baking powder.</td>
<td>8. Too little shortening.</td>
</tr>
<tr>
<td></td>
<td>10. Over mixing.</td>
</tr>
<tr>
<td>D. Texture is heavy and soggy. 11. Under mixing.</td>
<td>12. Inadequate creaming of fat and sugar.</td>
</tr>
<tr>
<td></td>
<td>13. Cake baked too quickly.</td>
</tr>
<tr>
<td>E. Cake is dry. 14. Sugar and fat mixture curdled on addition of egg.</td>
<td></td>
</tr>
</tbody>
</table>

57. The structure of a baked custard is due to:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Coagulated milk proteins.</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Coagulated egg proteins.</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>The presence of egg fats.</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>The presence of sugar.</td>
<td></td>
</tr>
</tbody>
</table>

58. Certain fruits turn brown when the cut surfaces are exposed to air. Check those in the following list which show this change.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Apples.</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Pineapple.</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Peaches.</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>Avocados.</td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td>White grapes.</td>
<td></td>
</tr>
</tbody>
</table>
59. You are to reduce the following recipe for a two layer cake to a one layer cake. Write the exact measurement in the blank spaces. Measure less than 1/4 cup by tablespoon. Measure less than 1/8 teaspoon as "few grains."

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>1 1/2 c.</td>
</tr>
<tr>
<td>Butter</td>
<td>1/2 c.</td>
</tr>
<tr>
<td>Milk</td>
<td>1 c.</td>
</tr>
<tr>
<td>Cake flour</td>
<td>3 c.</td>
</tr>
<tr>
<td>Eggs</td>
<td>2</td>
</tr>
<tr>
<td>Salt</td>
<td>1/2 tsp.</td>
</tr>
<tr>
<td>Baking powder</td>
<td>3 tsp.</td>
</tr>
<tr>
<td>Flavoring</td>
<td>3 tsp.</td>
</tr>
</tbody>
</table>

60. Below is a list of treatments that might be used in cooking meat. Also a list of results. Place the number or numbers of the treatments that correspond to the result in the blank provided.

<table>
<thead>
<tr>
<th>Results</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Increases tenderness</td>
<td>1. High cooking temperature.</td>
</tr>
<tr>
<td>B. Decreases tenderness</td>
<td>2. Low cooking temperature.</td>
</tr>
<tr>
<td></td>
<td>4. Stewing.</td>
</tr>
<tr>
<td></td>
<td>5. Prolonged cooking.</td>
</tr>
<tr>
<td></td>
<td>6. Freezing.</td>
</tr>
</tbody>
</table>

61. To ensure a baked potato of maximum meailness which method would you select from the following?

<table>
<thead>
<tr>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Wash, prick skins several times and bake.</td>
</tr>
<tr>
<td>B. Wash, dry and wrap in metal foil - serve without removing foil.</td>
</tr>
<tr>
<td>C. Wash, bake, slit open immediately on removing from oven.</td>
</tr>
</tbody>
</table>
62. The proper method of measuring 2/3 cup fat for pastry would be (a) to use individual 1/3 cup measure (b) to measure 1/3 cup water in a glass measuring cup and add fat until the level of the water reaches the 1 cup mark (c) to measure in tablespoons.

63. Custard is done when
   _____ A. It has a golden brown crust.
   _____ B. Silver knife comes out clean when inserted in center of custard.
   _____ C. Silver knife comes out clean when inserted midway between center and side of custard.
   _____ D. Small bubbles appear on sides of custard cup.

64. In choosing a container for a rib roast of beef which of the following would you select?
   _____ A. Dutch oven.
   _____ B. Open roasting pan.
   _____ C. Covered roasting pan.

65. The standard quantity of coffee used in the drip method is:
   _____ A. 1 level teaspoon per cup.
   _____ B. 3 level teaspoons per cup.
   _____ C. 2 level tablespoons per cup.
   _____ D. 3 level tablespoons per cup.
   _____ E. 1 level tablespoon per cup.

66. In making baking powder biscuits time and energy may be saved (a) by preparing the biscuits well ahead of time and storing in the refrigerator until ready to bake (b) weighing the ingredients into 1 bowl rather than measuring each ingredient separately (c) using approximate quantities rather than bothering to measure accurately.
67. Onions and the cabbage family both contain sulphur compounds. In order to give the most delicate flavor in the cooked product select the method you would use from the pairs below. From the list of reasons to the right place the number or numbers which led you to choose the method checked.

A. Cook onions in covered pan for short time.

B. Cook onions in adequate water in open kettle.

C. Cook shredded green cabbage in moderate water, cover off, 15-20 minutes.

D. Cook shredded green cabbage in moderate amount of boiling water 6-9 minutes.

- Reasons
  1. Sulphur compounds lose flavor when cooked.
  2. Sulphur compounds are mild in raw state but become more pronounced during cooking.
  3. Vegetable acids increase destruction of sulphur compounds and should escape.
  4. Speed of cooking decreases strong flavor.

68. In braising meat which of the following would you use?

A. A Dutch oven.

B. A broiler pan.

C. An open oven roasting pan.

69. Which of the following methods would you choose as being the best one to use when removing material remaining on a spoon or beater blades so that it may be returned to the original mixture?

A. Use a thin rubber scraper.

B. Tap gently on the side of the container.

C. Tap gently against your free hand.

70. When making potato salad which of the following would you choose?

A. Idaho potatoes.

B. Young new potatoes.
71. The grind of coffee used for making percolated coffee is:

_____ A. Regular.
_____ B. Fine.
_____ C. Coarse.

72. Designate by placing a line on each drawing the position in which you would insert a meat thermometer to obtain the proper degree of doneness.

73. If you wanted to prepare red cabbage with good color would you:

_____ A. Shred finely and cook in a small amount of water in covered pan.
_____ B. Shred finely, cook in open kettle with adequate water to prevent burning.
_____ C. Shred finely, cook in acidulated water, covered pan.
_____ D. Shred finely, cook in small amount of water, covered pan, and add a small amount of acid after cooking is complete.
74. Filling for cream pie contains sugar, flour, salt, scalded milk, egg yolks (beaten), butter and vanilla. Two methods for cooking the mixture are given below. One breaks 3 principles of food preparation. Under "A" put the choice of method you think is correct. Under "B" record the 3 principles which are violated.

Method I - Mix sugar, flour, and salt. Add milk, stirring constantly. Cook 15 minutes in a double boiler. Stir constantly until mixture thickens and afterwards occasionally. Combine a small amount of the mixture with the beaten egg yolks. Return to remainder of mixture, blend and cook three minutes. Add butter. Cool slightly and flavor with vanilla. Turn into baked pie shell.

Method II - Combine sugar, flour and salt. Stir in egg yolks. Then stir in milk gradually. Cook over boiling water 10 minutes stirring constantly. Add butter and vanilla, and cool slightly. Then turn into baked pie shell.

__________________________A. Choice of method.
__________________________B. Principles violated.

75. Which of the following substances added to egg white is most effective in preventing the overbeating of egg whites?

_____A. Cream of tartar.
_____B. Lemon juice.
_____C. Salt.
_____D. Sugar.
_____E. Water.
76. After fat has been used for frying the following points in its care are important in maintaining quality for future use.

A.
B.
C.
D.

77. Which in each of the following groups is the best purchase from the standpoint of cost per serving?

_____ A. Homemade french fried potatoes.
      _____ Frozen french fried potatoes.

_____ B. Homemade onion rings.
      _____ Frozen onion rings.
      _____ Canned onion rings.

_____ C. Homemade potato chips.
      _____ Commercial potato chips.

78. Which of the following is not a characteristic of a quality egg?

_____ A. A "stand-up" yolk.
      _____ B. Small air cell.
      _____ C. Firm vitelline membrane.
      _____ D. Thin spreading white.

79. If you were expecting guests for dinner and found that you had very little time, which of the following might you prepare?

_____ A. Flank steak.
_____ B. Swiss steak.
_____ C. Club steak.
_____ D. Salisbury steak.
80. The best type of container in which to make coffee is considered to be:

A. Glass.
B. Metal.
C. China.
D. Enamel.

81. In the left hand list below are several food products requiring beaten egg white. On the right hand list are the stages to which egg whites are usually beaten for different food products. Place the letter which best describes the stage used for each product on the line provided.

<table>
<thead>
<tr>
<th>Food Product</th>
<th>Degree of Beating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Fruit whip.</td>
<td>a - Foamy.</td>
</tr>
<tr>
<td>B. Cheese souffle.</td>
<td>b - Very stiff.</td>
</tr>
<tr>
<td>C. Hard meringues.</td>
<td>c - Stiff.</td>
</tr>
<tr>
<td>D. Fluffy omelet.</td>
<td></td>
</tr>
<tr>
<td>E. Sponge cake.</td>
<td></td>
</tr>
<tr>
<td>F. Clarifying soup.</td>
<td></td>
</tr>
</tbody>
</table>

82. How would you carry out each of the following procedures?

A. Melt 1/4 cup fat.

B. Measure 1 and 1/3 cup flour.

C. Line and prepare the lined pie tin for each of the following:

1. A fruit pie which will be cooked in the shell.
2. A pie shell to be cooked before the filling is added.

D. Bake a custard type pie.

83. The quantity of water in the bottom of a double boiler should be:

A. Sufficient to touch the upper part.
B. 1 inch deep.
C. Should leave about 1 inch between upper part and surface of water.
D. Makes little difference.

84. Which of the following would you consider the best method for cooking an egg hard, yet producing the most tender product?

A. Boiling water.
B. Simmering water.
C. Covered with water in upper part of double boiler.

85. List the following in order of the temperature at which they should be deep fat fried.

A. French fried potatoes.
B. Oysters.
C. Croquettes.
D. Doughnuts.
86. To provide continuous high quality coffee, the pot should be:
   A. Washed (how)
   B. Stored (how)

Insert the letter which satisfactorily completes the following statements.

87. _____ When making a conventional butter cake, eggs and shortening should always (a) be warm, (b) be cold (c) be at room temperature.

88. _____ The correct method of measuring flour is (a) to transfer it directly from storage container to measuring cup (b) to sift flour once before measuring (c) to sift flour twice before measuring.

89. _____ The oven should be turned on (a) a half hour before starting to mix a cake (b) before starting to measure the ingredients (c) after the cake is mixed.

90. _____ When making pastry by the conventional method the fat should (a) be at room temperature (b) slightly warm (c) cold.

91. _____ Best volume is obtained with baking powder biscuits when (a) the cut biscuits are allowed to stand at room temperature for 20 minutes (b) the biscuits are baked as soon as possible after mixing (c) the biscuits are held in the refrigerator for 1 hour before cooking.

92. Which of the following items are recommended for preparing french fried potatoes at home if you do not have an electric deep-fat fryer?
   _____ A. Shallow, heavy cast iron or aluminum pan.
   _____ B. Deep, heavy cast iron or aluminum pan.
For each of the following terms used in food preparation, write a brief definition or description:

93. **Au gratin**

94. **Bake**

95. ** Blanch**

96. **Braise**

97. **Caramelize**

98. **Dredge**

99. **Fricassee**

100. **Julienne**

101. **Knead**

For each of the following terms used in food preparation, write a brief definition or description:

102. **Pan-broil**

103. **Pan-fry**

104. **Parboil**
106. Poach
106. Sauté
107. Scald
108. Sear
109. Steep
SURVEY OF FOOD PREPARATION
LABORATORY PRACTICAL TEST

Following you will find the ingredients and proper quantities for making five products.

If you think your knowledge of cookery is sufficient to make these products you will proceed.

Plan your work so that all products will be ready for serving at the same time. Before starting preparation, write out the directions for making each product, including the management procedure and the kind of equipment necessary for making the product. Each product will be scored on written directions, method of proceeding, quality of the product, and the clean-up process.
Cream of Tomato Soup

1 cup tomato juice
1 slice onion
2 Tbsp. diced celery
1 clove
1/2 bay leaf
Salt
1/2 tsp. sugar
Pepper
1 cup milk
1 Tbsp. flour
1 Tbsp. butter
Soft Custard

1 egg
3/4 cup milk
1/4 tsp. vanilla
1 1/2 Tbsp. sugar
f. g. salt
Plain Muffins

1 cup flour
1 1/2 tsp. baking powder
1/4 tsp. salt
1 Tbsp. sugar
1 Tbsp. shortening
1/2 egg
1/2 cup milk
Buttered Broccoli

1 stalk fresh broccoli
Butter
Seasoning
Prune or Apricot Whip (uncooked)

1 egg white
1/4 c. fruit puree
2 Tbsp. sugar
1 tsp. lemon juice
salt
Reliability of the Difference Between Means in Small Independent Samples

When the N's of two independent groups are small (less than 30, say) the SE of the difference between means should depend upon SD's calculated by the formula

$$SD = \sqrt{\frac{x^2}{(N-1)}}$$

and the degrees of freedom in the two groups must be considered. Table D (p. 427 (t-table) may then be used conveniently to test the significance of t (t is a critical ratio in which a more exact estimate of the $\sigma^2$ is used. The sampling distribution of t is not normal when N is small, less than 50, t is a CR; but all CR's are not t's.), which is the appropriate critical ratio to be used with small samples. An example will illustrate the procedures.

Example (4) An interest test is administered to 6 boys in a Vocational class and to 10 boys in a Latin class. Is there a significant difference in mean score between the two groups?

Scores are as follows:

<table>
<thead>
<tr>
<th>Vocational Class</th>
<th>Latin Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>$N_1 = 6$</td>
<td>$N_2 = 10$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scores ($X_1$)</th>
<th>$x_1$</th>
<th>$x_1^2$</th>
<th>Scores ($X_2$)</th>
<th>$x_2$</th>
<th>$x_2^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>-2</td>
<td>4</td>
<td>20</td>
<td>-4</td>
<td>16</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>25</td>
<td>16</td>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>32</td>
<td>2</td>
<td>4</td>
<td>25</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>-6</td>
<td>36</td>
<td>34</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>26</td>
<td>-4</td>
<td>16</td>
<td>20</td>
<td>-4</td>
<td>16</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>25</td>
<td>28</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>180</td>
<td>24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$\Sigma N_1 = 30$</td>
<td></td>
<td>110</td>
<td>27</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10[440]</td>
<td></td>
<td>15</td>
<td>-9</td>
<td>81</td>
</tr>
<tr>
<td>$\Sigma N_2 = 24$</td>
<td></td>
<td></td>
<td>352</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In formula (52), \( \sum (X_1 - M_1)^2 = \sum x_1^2 \) is the sum of the squared deviations around the mean of Group 1; and 
\( \sum (X_2 - M_2)^2 = \sum x_2^2 \) is the sum of the squared deviations around the mean of Group 2. These sums of squares are combined to give a single SD. In Example (4) the sum of squares in the Vocational class around the mean of 30 is 110; and in the Latin class the sum of squares around the mean of 24 is 352. The df are \((N_1 - 1) = 5\), and \((N_2 - 1) = 9\).

(1 df is "used up" in computing each mean.) By formula (55), therefore, the SD = \( \sqrt{\frac{110 + 352}{14}} \) or 5.74. This SD serves as a measure of variability for each of the two groups. Thus the

\[
SE_{M_1} = \frac{5.74}{\sqrt{6}} \quad \text{and} \quad SE_{M_2} = \frac{5.74}{\sqrt{10}} \quad \left[ SE_{\text{mean or } \sigma_M} = \frac{\sigma}{\sqrt{N}} \right]
\]

Combining these two \( SE \)'s by formula (51)

\[
SE_D = \sqrt{\frac{\sigma_1^2}{M_1} + \frac{\sigma_2^2}{M_2}}
\]

we find that

\[
SE_D = \sqrt{\frac{(5.74)^2}{6} + \frac{(5.74)^2}{10}} = 5.74 \sqrt{\frac{16}{60}} \quad \text{or} \quad 2.96.
\]

Formula (53) combines the two \( SE \)'s enabling us to calculate \( SE_D \) in one operation.

\[
t = \frac{6}{2.96} \quad \text{or} \quad 2.03; \quad \text{and the df in the two groups}
\]

(namely, 5 and 9) are combined to give 14 df for use in inferring the significance of the mean difference. Entering Table D with 14 df, we get the entries 2.14 at the .05
For 14 df, the .05 level (Table D) is 2.14; and the .01 level is 2.96.

The mean of the interest scores made by the 6 boys in the Vocational class is 30, and the mean of the interest scores made by the 10 boys in the Latin class is 24. The mean difference of 6 is to be tested for significance. When two examples are small, as here, we get a better estimate of the "true" SD (in the population) by pooling the sums of squares of the deviations taken around the means of the two groups and computing a single SD. The justification for pooling is that under the null hypothesis no real mean difference exists as between the two samples, which are assumed to have been drawn from the same parent population. We have, therefore, only one (that of the common population) to estimate. Furthermore, by increasing N we get a more stable SD based upon all of our cases. The formula for computing this "pooled" SD and the formula for the SE of the difference are as follows:

$$SD = \sqrt{\frac{\sum (X_1 - \bar{X}_1)^2 + \sum (X_2 - \bar{X}_2)^2}{N_1 - 1} \times \frac{(N_1 - 1) + (N_2 - 1)}{N_1 N_2}}$$ \tag{52}

(\text{SD when two small independent samples are pooled})

$$SE_D = SD \sqrt{\frac{N_1 + N_2}{N_1 N_2}}$$ \tag{53}

(\text{SE of the difference between means in small independent samples})
and 2.98 at the .01 levels. Since our $t$ does not reach the .05 level, the obtained mean difference of 6 must be marked "non-significant."

A second example will illustrate further the use of levels of significance when samples are small.

Example (6) On an arithmetic reasoning test 31 ten-year-old boys and 42 ten-year-old girls made the following scores:

<table>
<thead>
<tr>
<th>Boys:</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.39</td>
<td>8.69</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Girls:</td>
<td>35.81</td>
<td>8.33</td>
<td>42</td>
</tr>
</tbody>
</table>

Is the mean difference of 4.58 in favor of the boys significant? By formula (52) we find

$$SD = \sqrt{\frac{(8.69)^2 \times 30 + (8.33)^2 \times 41}{71}} \text{ or } 8.48.$$  

$$\left[ SD^2 = \frac{\sum x^2}{(N-1)} ; \text{ hence } \sum x^2 = SD^2 \times (N-1). \right]$$

And by formula (53),

$$SE_D = 8.48 \sqrt{\frac{31 \times 42}{31 \times 42}} = 2.01.$$  

t is 4.58/2.01 or 2.28 and the degrees of freedom for use in testing the significance of the mean difference are 50 - 41 or 71. Entering Table D with 71 df we find $t$-entries of 2.00 at the .05 and of 2.65 at the .01 levels. The obtained $t$ of 2.28 is significant at the .05 but not at the .01 level. Only once in 20 comparisons of boys and girls on this test would we expect to find a difference as large or larger than 4.58 under our null hypothesis. We may be reasonably confident, therefore, that boys do better than girls on this test.
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I, Virginia Yapp Trotter, was born in Boise, Idaho, November 29, 1921. I received my secondary education in the public schools of Manhattan, Kansas. Kansas State University, also in Manhattan, Kansas, granted me the Bachelor of Science Degree in Home Economics in 1943. In July 1943 I married Robert Talbot Trotter, who was killed in World War II. We have one son, Robert Talbot Trotter II. I returned to Kansas State University and received the Master of Science Degree in Household Economics and Housing in 1948, where I held a graduate assistantship in the same department. Upon receiving the Master's degree I went directly to Salt Lake City, Utah, where I was Director of the Home Management House, and taught housing and consumer economics. In September 1950 I joined the staff at the University of Nebraska as Assistant Professor in Housing and Management. This position was a half-time teaching and a half-time research appointment. In 1955 I left the University of Nebraska to become Chairman of the Home Economics Department at the University of Vermont. I plan to return to this position upon the completion of the degree Doctor of Philosophy in Home Economics at the Ohio State University. For the year 1958-59 I received
three tuition reduction scholarships from the Ohio State University Graduate School. In 1960 I was awarded the American Home Economics Association Effie I. Raitt Fellowship.