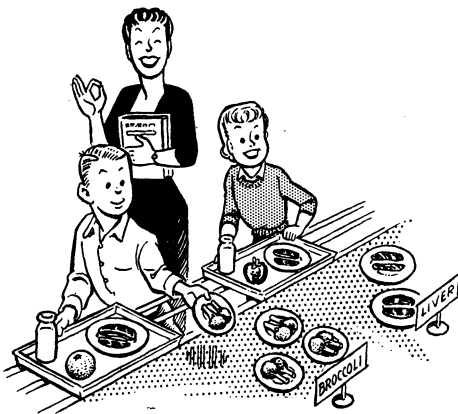


CHAPTER EIGHT

Evaluation

Effective evaluation serves both teacher and student in any learning situation. By means of evaluation the teacher notes the success of the teaching and the learning difficulties of students; the student is motivated by knowledge of his progress toward educational goals. Evaluation is a necessary step in making nutrition work.

An important purpose of evaluation is to determine the effectiveness of teaching methods for achieving objectives. For this pur-



... the teacher notes the success of the teaching.

pose your first step is to determine your objectives and state them so that the behavior you expect of students as a result of teaching is evident. For example, one of your objectives may be: To attain good nutrition because students select foods which provide nutrients in the amounts needed by the body. (Objective suggested in Chapter 3.) This objective is stated in terms of the behavior you expect of students. However, in this situation behavior is very complex; you will be unable to identify difficulties of students in achieving the objective unless it is further analyzed.

Your second step, then, is to restate this objective in terms of behavior that is specific enough to help you bring to light the difficulties of students. There are at least three aspects of learning which may be useful in organizing and selecting the types of behavior to be included in the evaluation of an objective in nutrition education. These are as follows: (1) acquisition of important information and judgment of dependable sources; (2) development of effective methods of thinking; (3) development of attitudes and values which will lead to self-motivation in selection of food for good nutrition.

As a dynamic approach to the problem of evaluating success in teaching for any objective in nutrition, the teacher will do well to list in these three categories the behavior which should result from the teaching. For the objective stated above, namely, the achievement of good nutrition through the proper selection of food, the following is such a list:

1. Acquisition of important information and appraisal of dependable sources
 - a. Recall facts related to the nutrients needed daily.
 - b. Recall facts concerning kinds and amounts of foods needed to ensure an adequate supply of these nutrients.
 - c. Recognize half-truths, incomplete facts, misinformation, or superstitions concerning a food or foods.
 - d. Have some criteria by which to evaluate sources of information.
2. Development of effective methods of thinking
 - a. Formulate reasonable generalizations from specific facts as shown by ability to:
 - 1) Interpret and use data from research related to nutritional needs of persons of different ages, states of health, and activities.



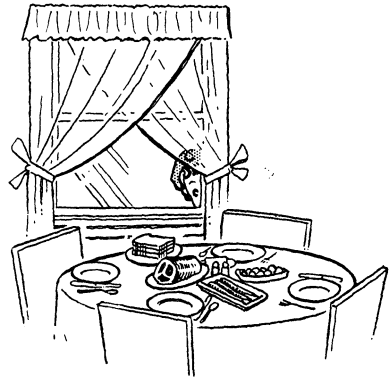
- 2) Recognize or formulate sound generalizations related to nutritional needs and ways to satisfy them.
 - b. Solve problems as shown by ability to:
 - 1) Make good decisions when selecting food.
 - 2) Analyze a problem relative to the choice of foods.
 - 3) Determine alternate courses of action and the values to be attained through each alternative.
 - c. Apply generalizations when making decisions.
3. Development of attitudes and values
- a. Be willing to try new foods.
 - b. Accept responsibility for own food practices.
 - c. Tend to be critical of information about nutritive value of foods until sources have been evaluated.
 - d. Maintain an open-minded attitude toward information about food.
 - e. Believe that food selection is essential to good nutrition, and good nutrition to health, and health to happiness.

Whatever the objective you choose, this first step of listing the behavior expected as a result of teaching in broad categories, such as the three described, will lead logically to the third step in the evaluation process.

The third step is to identify situations in which you might find students behaving in each of the ways suggested in the analysis of the objective. A paper and pencil test, check sheet, score card, rating scale, and progress chart represent commonly used instruments that are set up for evaluating the acquisition of information. But there are many other situations in which the dynamics of nutrition education may be tested. Some of these situations will be in the school, where you can observe behavior in the classroom, in the cafeteria, at school parties, or near dispensing machines. Other observations might be in homes or such places in the community as eating places or ball games. If nutrition education is to be effective it must work in these places.

The fourth step is to select and try the most promising methods for evaluating each of the objectives, paper and pencil tests as well as less formal methods. You will wish enough evidence about the progress of your students to draw some conclusions. This ideal is not always achieved, but use of all feasible methods of evaluation will yield more complete evidence than you could hope to get from one type of evaluation. In other words, a good evaluation program will employ devices to test the acquisition of knowledge, the development of effective methods of thinking, the development of attitudes, and identification of values which will lead to the con-

Other observations
might be in homes!



tinued motivation to attain good nutrition through the proper selection of food.

EVALUATION OF ACQUISITION OF FACTS

Whether or not students can recall the facts which you gave them the opportunity to learn is probably the easiest growth to evaluate. You can identify the facts that you consider most important, and from among them select those to use in the test. Paper and pencil tests are usually used for this evaluation. Examples are given of matching, true-false, and problem-type items.

All of these are short-answer types of test items. When you use this type of item rather than an essay type you can obtain responses to more items in a given length of time because students can answer them more quickly. Another advantage is that you can score the items more quickly and more objectively. You can more easily ascertain the relative ratings of the students in a group, or of one group with other groups.

If you wish to know how well students can recall reasons for the Basic Seven classification of foods, you may use *matching items* in a test such as this:

Select a food (or foods) in the right-hand column that is (or are) a good source of protein and place the number of that food in the first blank. Fill each succeeding blank by selecting the food (or foods) that is (or are) a good source of the nutrient, and place the number in the appropriate blank.

- | | |
|----------------------------------|----------------|
| _____ A good source of protein | 1. Beef |
| _____ A good source of vitamin A | 2. Oranges |
| _____ A good source of calcium | 3. Cabbage |
| _____ A good source of iron | 4. Cauliflower |
| _____ A good source of vitamin C | 5. Bread |
| | 6. Butter |
| | 7. Milk |
| | 8. Eggs |

As an illustration of the *true-false test*, items are taken from an unpublished test prepared by Barrick (1) as one means of evaluating methods used for teaching freshman college women. Students were instructed to read each statement carefully and then indicate their beliefs as follows:

T = True; you agree with the statement.

D = Doubtful; you doubt the truth of the statement.

F = False; you disagree with the statement.

U = Uncertain; you are very uncertain whether the statement is true or false.

Here are some of the statements:

Vitamin pills should be taken by people who dislike many foods. —

Products made from milk have the same nutritive value. —

Canned pineapple is a good source of vitamin C. —

A reducing diet should consist largely of fruits and vegetables. —

In the same test are items that express half-truths. This kind of an item is different from one that is completely wrong or right. Examples of these items are:

An easy way to reduce is by taking exercises. —

Poor nutrition is often one of the underlying causes of juvenile delinquency. —

Milk is a perfect food. —

A safe way to reduce is to eat small portions of everything served. —

If you add a response, P, to the four above, you can use the last four items to determine whether or not students detect half-truths. A new response might read P = Partly true; you believe that the statement is partly true.

Students who mark the last four items P thus will be answering correctly because the statements are neither true nor false. Opportunity to make this response helps the most discerning students because they are most likely to detect half-truths.

Another kind of true-false item in Barrick's test identified the knowledge of students about certain superstitions. Three statements illustrate this kind of item:

Sugar diabetes is caused by eating too much candy. —

Food should be removed from a tin can immediately after opening or it will be unfit for use. —

A food allergy is an intense dislike for a food. —

When scoring a test including these three kinds of true-false statements, you will obtain more specific or exact information about the difficulties of students by three separate scores than a single score. With a score for each type of error, you and the students will be aware of their misconceptions.

The *problem-type question* may be used to check the accuracy of information. It has the advantage of presenting facts about a

situation so that there is less likelihood of misunderstanding the statement to which reaction is requested. This type of item was selected from another test used by Barrick (1). The directions for this test were:

On the following pages you will find described a series of situations involving nutrition problems. Read each one carefully and check (x) the answer or answers on the answer sheet. After selecting the best answers, read the entire list of reasons and check on the answer sheet those that explain why your answers are the best ones.

One item in the test read:

Marge Macley is allergic to tomatoes in any form. Several fruits are served at the dorm for breakfast, so she can avoid tomato juice. Since the meals at the dorm are planned to meet daily requirements for good nutrition, it is important that she choose the right fruits. If she eats plenty of green and yellow vegetables, which of these could she select that will be good substitutes for the tomatoes?

- | | |
|---------------|--------------------|
| a. Grapefruit | c. Oranges |
| b. Prunes | d. Pineapple juice |

Check the reasons why the fruits you checked above are good substitutes for tomatoes.

1. Grapefruit, like tomatoes, is high in vitamin B.
2. Grapefruit contains a large amount of vitamin C.
3. Prunes supply roughage.
4. Prunes are high in iron.
5. Oranges are a citrus fruit and so will substitute for tomatoes.
6. Pineapple is a citrus fruit.
7. Pineapple is an important source of vitamin C.

Any type of *essay writing* expected of students can be examined for accuracy of information. The essay type of evaluation has advantages and disadvantages. One advantage is that students may not be aware that the accuracy of their information is being tested. In other words, in an essay examination the student's ability to call up spontaneous information has an opportunity for expression. Disadvantages are that (1) only a small sample of information is used by the student, and (2) the time used by the teacher in discovering



and pointing out errors of students may be greater than that required for constructing and scoring a short-answer type of test.

Knowledge of dependable sources of information is not simply a recall of information. To achieve this objective students must know sound criteria for judging the source of information and be able to use these criteria when accepting or rejecting information that they read or hear.

The criteria suggested on page 108 can be the basis for tests similar to the ones suggested for recall of facts. Before testing ability to use these criteria, you will wish to know whether or not the criteria are known and accepted by students.

Tests of ability to *use* the criteria may be similar to those on page 161, where ways for evaluating ability to apply generalizations are discussed. Actually, criteria are generalizations that indicate the importance attached to certain characteristics of a product.

Steps to follow in constructing such a test are:

1. Present excerpts from 2 articles to your students, giving complete information of authorship and publication.
2. Have students select the article considered most reliable, with reasons for their selection.
3. Select student statements of reasons which:
 - a. support each article and are good criteria.
 - b. are not sound criteria for determining reliability of the article.
 - c. are not relevant to the problem.

EVALUATION OF DEVELOPMENT OF EFFECTIVE METHODS OF THINKING

Ability To Interpret Data

The ability to interpret data is one aspect of ability to think that is often one of the objectives of a teacher of nutrition. The effectiveness of many visual materials is limited unless students are able to interpret for themselves what they see. For example, ability to identify similarities and differences in characteristics of well-nourished and poorly nourished individuals requires a different level of ability from the ability to memorize these characteristics as they are pointed out by the teacher.

If you have used the pictures of the two teen-age girls on page 96 to teach students to identify important differences in physical characteristics of well-nourished and poorly nourished individuals, you can use the pictures of the two boys on page 30 as a new situation to test the ability of your students to distinguish differences between them. The first time or two the pictures are used as a testing situation you can ask such questions as: Which of the two boys seems to be the more healthy? Give reasons for your answer. The reasons

given by each student may be classified in several ways: (1) characteristics of good health shown by the boy chosen as the more healthy, (2) characteristics of this boy that do not indicate his state of health, (3) characteristics of good health that are not evident in the picture of the boy. This procedure will reveal whether or not students can identify accurately the characteristics of good health as shown in the picture.

When constructing a short-answer test item you will wish, among statements of reasons to which students can react, some of each type that apply to each boy. Since statements in the language of students are not likely to be obviously wrong or right, the answers you receive from them can be selected from each of the three classifications suggested in the previous paragraph.

When interpreting data from such a test you will discover students who (1) recognize all of the characteristics that apply to the picture of the boy chosen; (2) are unable to distinguish between characteristics that apply to the problem and those that do not; (3) know the characteristics of a healthy person but do not restrict their answers to the problem of nutrition.

Tests similar to those using the pictures of the two boys can be based on data such as are found in graphs, tables of food composition, pictograms similar to those in Chapter 3, charts such as those which show growth curves of rats on different diets. In each case, a student's responses will indicate whether he (1) can accurately show relationships among the data, (2) can see all of the relationships in the data, and (3) does not go beyond the data presented and thus over-generalize.

At the end of a lesson, you can test informally the ability of students to interpret data if you ask them to write in complete sentences what they have learned during the lesson. Thus you will know which of your students can state generalizations that are complete and accurate.

Ability To Apply Generalizations

Ability to apply generalizations of nutrition when making decisions is different from ability to generalize. A short-answer type of item for this evaluation presents a situation in which a person is required to make a decision. Two or more alternatives are offered, from which the student must choose one. After making a choice he checks facts or generalizations that are reasons for his answer. Among the reasons are untrue statements and true statements that do not explain the choice made. If several such items are included in a test, you will have some evidence of a student's ability to apply generalizations accurately.

The two items which follow were selected from a bulletin prepared by Chadderdon, Brown, Downing, and Kelly for the Iowa State Department of Education (2).

I

Mary's mother has joined a Red Cross class that is studying good foods for the family. She has brought home with her a list of meals about which she is to make certain decisions. Mary is quite excited to think that her mother is studying some of the same questions that she has been discussing in her Home Economics class. Mary has decided to answer the questions and compare with her mother's answers.

If a growing girl has the following foods for breakfast and dinner:

Breakfast:

Sweet roll
Cocoa

Dinner:

Meat loaf	Bread-butter
Creamed potatoes	Cookies
Buttered peas	Milk

which one of these four lunches would be best to complete her meals for the day:

A

Potato salad
Rice pudding
Milk

B

Peanut butter sandwich
Pea and cheese salad
Cornstarch pudding
Lemonade

C

Tomato lettuce salad
Minced meat sandwich
Fresh fruit — Sugar cookie
Milk

D

Sliced ham
Cheese sandwich
Milk

Put an x on your answer sheet in front of the letter of the menu which you think is best.

Put an x on your answer sheet in front of the numbers of the reasons why your choice is the best:

1. She should have one full serving of meat or fish daily.
2. One serving of potatoes should be eaten daily.
3. Peanut butter sandwiches are very good for lunch.
4. She needs a quart of milk a day, and milk for lunch helps her get the amount she needs.
5. She should eat some fruit each day.
6. One serving of cheese can take the place of meat for the day.
7. Rice pudding gives strength to work well
8. One serving of sweets each day gives heat and strength.

II

Grace Brown, a friend of Mary's, does not eat breakfast because she says she is not hungry in the mornings. She walks ten blocks to school and doesn't want to carry a lunch, so she buys a hamburger or candy bar at noon and hurries out on the playground to play baseball. By three o'clock she is too tired to work her arithmetic problems. Mary tells her that in order to get all of the foods she needs each day to keep her healthy and physically fit she must eat three meals a day. Grace laughed at Mary but has agreed to try it, with Mary's help. Which daily menu, A or B, is better for Grace?

A

Breakfast:
 Cream of wheat
 Nut muffins
 Applesauce
 Cocoa

Lunch:
 Mashed potatoes
 Green string beans
 (buttered)
 Whole wheat bread
 Chocolate cake
 Milk

Dinner:
 Macaroni and cheese
 White bread — butter
 Buttered cabbage
 Potato salad
 Cream pie
 Cocoa

B

Breakfast:
 Orange juice
 Oatmeal
 Whole wheat toast
 Milk

Lunch:
 Vegetable soup
 Crackers
 Baked apple
 Cookie
 Milk

Dinner:
 Creamed eggs
 Baked potatoes
 Head lettuce salad
 Whole wheat bread —
 butter
 Canned peach sauce
 Milk

Mark on your answer sheet the one that you think is the better of the two to give Grace the foods she needs for the day.

Mark on your answer sheet the reasons why you think your choice is the better of the two:

1. The meals contain two servings of whole-wheat cereal.
2. The meals contain a citrus fruit which should be eaten every day.
3. The dinner contains cocoa which is hot and gives her some milk.
4. Buttered cabbage gives one of the kinds of vegetables needed daily.
5. The meals contain a quart of milk which she needs every day.
6. Eggs make our bodies grow and should be eaten at least 3 or 4 times a week.
7. Cheese takes the place of the meat and builds muscles.
8. Cake and pie give sugar and fat which our bodies need for heat and strength.

Another way to evaluate ability to apply generalizations is to judge the work of students when they prepare exhibits and posters. You can observe the importance of the generalizations they select to illustrate the appropriateness of the illustrations and the accuracy of captions. If you do not wish to have students prepare exhibits or posters, they can evaluate those prepared by others. Your questions can direct them to use their knowledge of generalizations as bases for their evaluations. If you require complete sentences when students make these evaluations, you can judge ability to apply generalizations.

The foods that individuals eat are one indication of ability to apply generalizations of nutrition. Food records kept for 3 to 7 days provide more reliable data than do occasional observations of

food practices in public places. Seven-day records taken at intervals throughout the year probably give the best over-all picture of food consumption, but such records are not feasible in many situations. Directions for keeping and scoring 3-day food records are given in Appendix D, pages 187 to 193.

Data from food records must be interpreted cautiously because several factors may be influencing the kind and amount of food eaten. Students may know the generalizations and how to apply them, but may not actually practice good nutrition because (a) appropriate food is not available to them; (b) they do not believe that what they eat will make a difference in their health; (c) satisfactions other than health may be of major importance to them.

EVALUATION OF DEVELOPMENT OF ATTITUDES AND VALUES

Attitudes about food may have greater influence on food consumption of individuals than facts they can recall about nutrition. Food preferences seem to be related to willingness to try new foods. Studies of food preferences of different groups of people were reported in Chapter 7. You can study the food likes and dislikes of your students by asking them to check a questionnaire similar to the one used by Adams (3). Directions for checking the questionnaire and the first item are given below.

This is not one of the usual types of examinations, because all answers are the right answers. They will not affect your class grade. The following pages contain a list of foods commonly served in the Middle West. Many of the usual methods of preparation are included.

Directions for taking the test: The space numbered but left blank is for you to fill in with a method of preparation that you like, if that method is not listed. Be certain to place a check in the proper place after this item.

Please read carefully and place a check for each item in the appropriate column to the right. Do not omit any item.

Foods	I like it and always eat it when it is offered	I will eat it, but do not enjoy it	I dislike it and will not eat it	I have not tasted it
Vegetables				
1. Asparagus				
a. Kind				
1) Fresh	_____	_____	_____	_____
2) Frozen	_____	_____	_____	_____
3) Canned	_____	_____	_____	_____
b. Method of preparation				
1) Buttered	_____	_____	_____	_____
2) Creamed	_____	_____	_____	_____
3) On toast	_____	_____	_____	_____
4) Cooked, in salad	_____	_____	_____	_____
5) _____	_____	_____	_____	_____

Systematic observations of individuals in situations where their choices seem to depend upon willingness to try new foods is another way to evaluate this objective. For example, responses of individuals to invitations to eat foods prepared in a demonstration or by class members will reveal attitudes toward food. Another situation for such observations is afforded when a group plans for foods to be prepared. A group of mothers requested a demonstration of ways to prepare green and yellow vegetables. This request indicated that they were willing to try to increase the acceptance of this group of foods by their families.

Anecdotal records of your observations will give data for evaluation that are more reliable than casual observations. Often an accumulation of incidents will reveal changes in attitudes that are not evident in one or two observations. Such records require time to keep, and are not necessary for everyone. They are most valuable for the student whose attitude seems to need changing.

Probably the most difficult attitude to change is that food does not really make a difference in the way one looks, feels, and acts. Evaluation of students in this respect is difficult too. Barbour interviewed students to discover what they believed were the functions of different foods. One question that she asked, with the student responses, illustrates this method of determining their beliefs about food.

Question: Does kind of food eaten affect the way you look?

Answer: Yes.

Reasons given:

1. Eating right foods makes you look better.
2. Have nicer teeth.
3. Sweets make pimples on your face.
4. Kind of food affects complexion.
5. Kind of food affects hands and fingernails.
6. Chocolate and rich foods cause pimples.
7. Not enough food makes you look thin.
8. Some foods give color to your face.
9. Carrots make eyes look well.
10. Make a face when you eat sour or strong foods.
11. Too much fat and starches make you fat.
12. Some foods make hair glossier.
13. Kind of food affects posture.
14. Plenty of proteins fill you out, otherwise you are skinny.
15. Not enough carrots make eyes dull and sore.

Satisfactions from the enjoyment of food or from belonging to a group may be more important to your students than health. To discover the values that her students associated with food, Nichol (5)

prepared and gave a values test to a group of boys. An item from her test illustrates one type of values test:

Read the following situation carefully and decide how you would act in a similar situation.

Jim is 15 years old and in the 10th grade. His best friends go to a restaurant for lunch where the food is rather carelessly prepared and served but where the boys have a lot of fun. About the only kind of lunch they can get is a sandwich, cake or cookies, and a beverage. Jim doesn't often



go with his friends and they cannot understand why he doesn't go with them. Jim enjoys the fun at the restaurant but he doesn't like the food. He thinks he should have more vegetables and fruit and salads to stay healthy. He can get these at the school cafeteria and he likes the food there much better, although the cost is slightly higher. Jim's parents think he is wise to go to the cafeteria.

Check *each* of the following statements to show how each reason would influence your decision in this situation:

VG if you think it is a very good reason and would greatly influence your decision.

G if you think it is a good reason and might influence your decision.

U if you are uncertain whether it would influence your decision.

P if you think it is a poor reason and would seldom influence you.

VP if you think it is a very poor reason and would never influence you.

	VG	G	U	P	VP
1. It is foolish to save money and have a poor lunch.	—	—	—	—	—
2. Jim should consider whether he enjoys his lunch or not.	—	—	—	—	—
3. Jim should do what he wants to — it wouldn't make any difference to his being well liked by his friends.	—	—	—	—	—
4. If Jim is healthy, he doesn't have to worry about what he eats.	—	—	—	—	—
5. Jim should take the advice of his parents.	—	—	—	—	—
6. Jim should save as much as he can on his lunch if he needs money for other things.	—	—	—	—	—

7. Health is one of the most important considerations when choosing food.
8. Jim will lose his popularity with the group if he doesn't go with them.
9. It is important for Jim to enjoy his lunch.
10. Jim is old enough to make up his own mind and his parents should not try to influence him.

VG	G	U	P	VP
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—

When you are evaluating willingness to try new foods, you may also discover how well students will accept responsibility for their own food practices. Whenever free choices can be made, responsibility must be accepted. Whether or not students recognize this fact is not easy to determine. Essays which contain free expression of ideas may be most fruitful in revealing attitudes toward personal responsibility. Interviews with students or their parents are helpful, too.

Interest in keeping personal records of growth up to and through adolescence indicates acceptance of responsibility for one's own health. Records of weight kept after growth is completed indicate the same attitude. These records will be especially revealing if growth charts and other records are kept at the same time. One kind of record may be of foods eaten. When the relationship between these two records is recognized, students show satisfactory understanding of this aspect of nutrition.

STUDENT EVALUATION OF TEACHING

Student evaluation of what they have learned from a lesson, unit, or nutrition program may give some data that are not obtained in any other way. If you ask what was the most important thing learned today, you will discover the emphasis which was recognized by students.

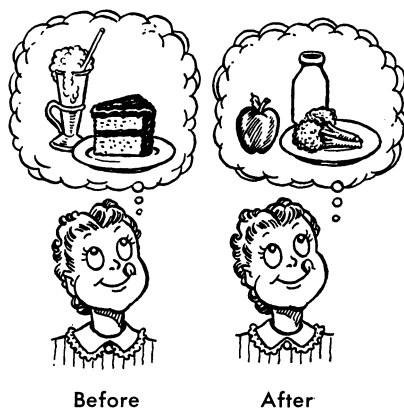
To obtain student appraisal of your methods, you can ask such questions as: What is the strongest thing about these lessons? What is the weakest thing about them? What suggestions have you for improvement?



Interpretation is very difficult when opinions of students are used for evaluation. Their opinions must be examined in terms of your objectives, and not always accepted exactly as given. For example, if one of your objectives is to teach students to think, those students who wish you to tell them the answers to their questions may criticize your teaching. When you study their criticisms, you must decide which ones indicate a need to revise your methods and which reflect resistance to your requirement that students think for themselves.

EVALUATION AS A MEANS OF IMPROVING TEACHING

Up to this point evaluation has been discussed as revealing what students have attained in relation to objectives. This is an important



function of evaluation if you wish to discover the difficulties of students, and to motivate them to change by making them aware of failure to achieve the objectives of the nutrition program. Such evaluation is only the beginning if you wish to evaluate the effectiveness of your teaching in terms of student growth, or to use knowledge of progress as a means of motivating students. When evaluation is to serve these two purposes, you must determine the status of students before and after teaching. Whether or not evaluation is effective for motivation depends upon how you use it.

If you wish to interpret data from evaluation and use them as a basis for modifying teaching methods, you may find it advisable to note the success of your teaching before the nutrition unit is completed. Thus you will know whether or not students are progressing satisfactorily for the time spent and for their maturity.

Where progress is not so great as you believe is desirable, you will see that students have different learning experiences.

When evaluation is considered an integral and necessary part of every learning situation, your teaching is likely to be most successful. When data concerning the growth of students are incomplete, your judgment may not be sound. The methods you use to evaluate the growth of students will influence what they learn. For these reasons a variety of techniques and devices have been suggested for noting the growth of students toward different objectives.

The purposes of this chapter have been to illustrate: (1) statement of objectives in terms of student behavior; (2) selection of methods of evaluation that will reveal the kind of behavior indicated as desirable by the objectives; (3) devices that have been found useful; (4) some interpretations possible when certain methods are used. There has been no attempt to discuss ways that the validity or reliability of tests can be determined.

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APPENDIX A

Guide for Identifying Foods in Food Groups and Defining Servings

THE SEVEN BASIC FOODS GROUPS

1. Dairy products

The standard serving of fluid whole milk is 8 ounces or one-half pint or 1 cup. The approximate equivalents of 1 serving of whole milk in terms of other dairy products and appropriate supplements are:

Whole milk (dry)	.....4 tablespoons
Evaporated milk	.....½ cup
Condensed milk	.....⅓ cup ¹
Skim or nonfat milk (fluid)	....1 cup plus 1 serving (slightly less than 2 teaspoons) of butter or fortified margarine ²
Buttermilk (made from skim milk)	..... See skim or nonfat fluid milk
Nonfat milk solids (dried skim milk)	.....4 tablespoons plus supplements suggested for fluid skim milk
Cheddar cheese	.....1 ounce (approximately 1-inch cube) ³
Cottage cheese	.....1 cup plus 1 serving of butter or fortified margarine ⁴

¹ Has extra calories equivalent to about 3 tablespoons of sugar.

² Green and yellow vegetables may replace the fat as a supplement in low-calorie diets.

³ Slightly low in calories, thiamine, riboflavin, and calcium, as compared with one cup of fluid milk.

⁴ One serving is usually not more than ½ cup. To be made approximately equivalent to 1 cup of milk, this amount should be supplemented with one large serving of table fat plus one serving of green leafy vegetable, as turnip greens.

Butter	..... 1 serving (about $\frac{1}{2}$ tablespoon) plus 1 cup of fluid skim milk or its equivalent
Cream (light)	..... 2 to 4 tablespoons plus $\frac{3}{4}$ cup of fluid skim milk
Cream (heavy)	..... 1 tablespoon plus 1 cup of fluid skim milk
Yogurt	..... variable; approx. $\frac{2}{3}$ cup if made from concentrated milk or with milk solids added

Include in total milk intake the approximate amounts of milk furnished by foods prepared with it, as:

Ice cream	Cream pie
Pudding	Cereal with milk
Cream soup	Cocoa

Allow about one-half cup of milk per serving from foods of these types.

2. Green, leafy, or yellow vegetables and yellow fruits

Foods included in this group contain the equivalent of at least 1,000 I.U. of vitamin A per 100 grams or per $\frac{1}{2}$ cup as prepared for serving.

Dandelion greens	Collards	Cantaloupe
Spinach	Winter squash	Water cress
Carrots	Beet greens	Broccoli
Chard	Kale	Tomatoes
Sweet potatoes	Pumpkin	Mustard greens
Turnip greens	Apricots	

3. Vitamin C-rich fruits and vegetables

Foods included in this group contain at least 25 milligrams of vitamin C (ascorbic acid) in servings of about $\frac{1}{2}$ cup.

Oranges	Lemons	Honeydew melon
Orange juice	Lemon juice	Cooked greens
Grapefruit	Cantaloupe	Broccoli
Grapefruit juice	Strawberries	Cauliflower
Tangerines	Green peppers	Brussels sprouts
Tangerine juice	Tomatoes	Cabbage

4. Other fruits and vegetables

This group includes fruits and vegetables not in Groups 2 and 3. Although they are not rich sources of the nutrients planned for in the daily diet, they are helpful in supplying the total amount of vitamins and minerals needed. Some of the most frequently used are:

Potatoes ²	Snap beans ¹	Rhubarb
Corn	Asparagus ¹	Raspberries ²
Beets	Apples	Cherries ¹
Peas ¹	Bananas	Blackberries ²
Lettuce (head)	Pears	Prunes ¹
Onions	Peaches ¹	Pineapple
Turnips ²	Plums	Raisins

¹ These provide a substantial amount of vitamin A (in the form of carotene), but not in sufficient amounts to permit classification in Group 2.

² These provide vitamin C, but not in sufficient amount to permit classification in Group 3.

5. Protein-rich foods

Foods which provide 15 to 20 grams of protein in a 3- to 4-ounce serving are included in this group.

Beef steak, roast, hamburger	Chicken
Veal	Turkey
Pork chops or roast	Fish
Lamb chops or roast	Game
Organ meats, as liver and heart	

Foods which require 2 or 3 servings to be approximately equivalent to one serving of meat are listed below.

Eggs
 Milk
 Cottage cheese ($\frac{1}{4}$ cup)
 Cheddar cheese (1 ounce or 1-inch square)
 Legumes, as navy or lima beans, dried peas, peanuts, and peanut butter

6. Bread and cereals

Foods included in this group are:

Bread	Macaroni	Popcorn
Biscuit	Noodles	Doughnut
Muffin	Rice	Sweet roll
Bun	Spaghetti	Cooky
Pancake	Vermicelli	Crackers
Waffle	All breakfast foods	Plain cake

7. Fat and sweet foods

Butter	Nuts	Jelly
Cream	Bacon	Candy
Oleomargarine	Salt pork	Sweet desserts not mainly
Salad dressing	Sugar	milk, eggs, fruit
Gravy	Sirup	

APPENDIX B

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APPENDIX C

Explanation of Terms in Generalizations

- Acne vulgaris** — a simple uncomplicated condition resulting in a raised eruption on the skin due to inflammation, with accumulation of secretion, of the oil-secreting or sebaceous glands.
- Allergy, food**¹ — hypersensitiveness to a substance in food which is ordinarily harmless in similar amounts for the majority of persons.
- Amino acids** — the nitrogen-containing acids obtained when protein materials are broken down chemically. The differences between proteins are largely a matter of the number, the kind, and the arrangement of such amino acids within the protein substances.
- Amino acids, essential**² — amino acids which need to be included in the diet, i.e., which either cannot be synthesized in the body or not at a rate sufficient to meet the need.
- Anemia** — a reduction in the amount of hemoglobin in the blood or in the number of red corpuscles of the blood.
- Appetite**³ — the inclination or desire to eat; distinguished from hunger as the drive to eat.
- Ascorbic acid** — (see Vitamin C.)
- Ash**⁴ — the total mineral matter residue after ignition of a food; always either neutral or alkaline, since acid in excess of that which can be neutralized is volatilized.
- Bacterial action** — changes produced by one-celled microorganisms such as those involved in fermentation, synthesis of vitamins, soil fertilization, decay of organic matter, and many diseases.

¹ Dorothea Turner. *Handbook of diet therapy*. 2nd ed. University of Chicago Press, Chicago, p. 123, 1952.

² *Ibid.*, p. 123.

³ H. C. Sherman and Caroline Lanford. *Essentials of nutrition*. 2nd ed. The Macmillan Co., New York, p. 418, 1944.

⁴ Turner, *op cit.*, p. 124.

- Calorie**⁵ (large or kilocalorie) — the unit used to express food energy; the amount of heat required to raise the temperature of one kilogram of water one degree Centigrade.
- Carbohydrates** — a large group of chemical substances containing carbon, hydrogen, and oxygen; forms commonly seen are starch and various kinds of sugar.
- Carotene**⁶ — provitamin A. A yellow-red plant pigment occurring in several forms; B-carotene is the most abundant form in common green leafy and yellow vegetables.
- Cellulose** — a constituent of the cell walls of plants forming the basis for vegetable fiber; chemically, a carbohydrate having about the same percentage composition as starch.
- Congenital** — existing at birth, referring to certain mental or physical traits, peculiarities, or diseases.
- Connective tissue** — (see Tissue.)
- Dental caries** — the progressive decay of tooth structures.
- Emotional disturbances** — an interruption of ability to resist forces which tend to arouse strong feelings; a disturbed mental state resulting in agitation and confusion.
- Emotional stability** — ability to resist forces which tend to arouse strong feelings or disturbed mental states.
- Environment** — the conditions and influences under which one lives. Everything that conditions the life process except the hereditary or genetic factors.
- Fats** — the name given to a group of chemical substances composed of the same three elements as carbohydrates, namely, carbon, hydrogen, and oxygen, but in different proportions; fats constitute a much more concentrated form of food energy. Fats have an oily texture and are not soluble in water.
- Fermentative** — relating to chemical change that takes place in an organic substance caused by certain fungi, bacteria, and enzymes, and is accompanied by evolution of gases often evidenced by hissing and bubbling.
- Flour, enriched**⁷ — white flour enhanced in thiamine, riboflavin, niacin, and iron value by changing the milling process to retain these constituents or by addition of the chemicals to white flour. The minimum levels specified in the standards of identity promulgated under the Food, Drug and Cosmetic Act are: thiamine, 2.0 mg.; riboflavin, 1.2 mg.; niacin, 16 mg.; and iron, 13 mg. per pound. Certain levels of vitamin D and calcium are permitted as optional ingredients. States which require enrichment of white flour have generally been guided by the federal legislation.
- Food**⁸ — any substance which may be used to yield energy; to build or renew body tissue; or to regulate body processes and internal conditions, so as to maintain a right internal environment for life.
- Food energy value** — refers to the carbohydrate, fat, and protein content of the diet, since these constituents release energy as they are broken down in the cells of the body; commonly expressed as calories, since heat is a measurable by-product of the energy released when the carbohydrate, fat, and protein are broken down.
- Food, fortified**⁹ — a food to which a vitamin or other dietary essential has been added in such an amount as to make the total content of the dietary essential larger than that contained in any natural (unprocessed) food of its class, for example, vitamin D milk and fortified margarine.
- Food, utilization of** — refers to the process by which ingested food is digested, absorbed, distributed, and assimilated by the cells of the body.
- Fortified margarine** — (see Margarine.)

⁵ *Ibid.*, p. 124.

⁶ *Ibid.*, p. 125.

⁷ *Ibid.*, p. 128.

⁸ H. C. Sherman. *The chemistry of food and nutrition*. 8th ed. The Macmillan Co., New York, p. 7, 1952.

⁹ Turner, *op. cit.*, p. 128.

Goiter, simple¹⁰ — enlargement of the thyroid gland, caused by an absolute or relative deficiency of iodine.

Hemoglobin — the red coloring matter of the blood found in the red blood cells; contains iron and is capable of uniting loosely with oxygen.

Heredity — the tendency of any living thing to reproduce the characteristics of its ancestors.

Hunger — a strong desire for food.

Ingestion — the introduction of food or drink into the stomach.

International Unit — a unit of measure established by a committee appointed by the Health Organization of the League of Nations, used for expressing the content of vitamins in foods and other materials; usually dropped when vitamin values can be conveniently expressed in weight but now used mainly for vitamins A and D. The recommended allowance for vitamin D for infants and children, including adolescents, and for women during pregnancy and lactation, is 400 International Units per day.

Iodized salt — (see Salt.)

Lactation — the period following childbirth during which milk is produced by the mammary glands of the breasts.

Lactic acid — a three-carbon organic acid formed as an intermediary in carbohydrate metabolism; produced by certain kinds of bacteria when acting on food residues, particularly milk.

Malnutrition¹¹ — a condition of the body resulting from an inadequate supply or impaired utilization of one or more of the essential food constituents.

Margarine, fortified¹² — margarine with vitamin A added. The margarine on the market in the United States is fortified with 15,000 I.U. of vitamin A per pound.

Membrane, mucous — tissue lining the passages which lead into and out of the body and which secrete a clear viscid substance; examples are the digestive, respiratory, and urinary tracts.

Mental activity — the functional activity of the mind.

Metabolism¹³ — a general term to designate all chemical changes which occur to substances within the body after absorption. These changes include constructive (anabolic) and destructive (catabolic) processes.

Metabolism, intermediary¹⁴ — the transfers and chemical changes undergone by nutrients after digestion and absorption.

Milk, vitamin D — milk processed or produced to provide vitamin D; may be produced by three different methods:

- 1) "fortified" milk, which is now more generally distributed than the other types, is that to which a vitamin D concentrate has been added;
- 2) "metabolized" milk is produced by feeding the cows irradiated yeast; and
- 3) "irradiated" milk has been exposed directly to ultraviolet rays.

The standard amount used for fortification is 400 I.U. of vitamin D per quart of fresh or reconstituted milk.

Minerals¹⁵ — "inorganic elements." The following are known to be present in body tissues; calcium, cobalt, chlorine, copper, fluorine, iodine, iron, magnesium, manganese, phosphorus, potassium, sodium, sulfur, and zinc. These constituents, obtained from food, aid in the regulation of acid-base balance of body fluids and of osmotic pressure, in addition to the specific function of individual elements in the body. Some minerals are present in the body largely in organic combination, as iron in hemoglobin, and iodine in thy-

¹⁰ Turner, *op. cit.*, p. 128.

¹¹ *Ibid.*, p. 129.

¹² *Ibid.*, p. 128.

¹³ *Ibid.*, p. 129.

¹⁴ H. C. Sherman and Caroline Lanford. *Essentials of nutrition*. 2nd ed. The Macmillan Co., New York, p. 421, 1944.

¹⁵ Turner, *op. cit.*, p. 129.

roxine; others occur in the body in inorganic form, as calcium salts in bone, sodium and chlorine as sodium chloride. The terms "minerals" and "inorganic elements" do not imply that the elements occur in inorganic form in food or body tissue.

Neuromuscular tremor—a trembling or shaking produced by nerve stimulation of contractile tissues of the body by which movements of the various organs and parts are affected.

Niacin, or nicotinic acid—a water-soluble heat-stable member of the vitamin B complex; needed for the use of the nutrients by the tissues. The anti-pellagic factor.

Nutrient¹⁶—a substance which takes part in any of the three ways by which food nourishes the body. Some nutrients function in more than one of these ways.

Nutrition¹⁷—the combination of processes by which the living organism receives and utilizes the materials necessary for the maintenance of its functions and for the growth and renewal of its components.

Nutrition, normal¹⁸—a condition of the body resulting from the efficient utilization of sufficient amounts of the essential nutrients provided in the food intake.

Nutritional status¹⁹—the condition of the body resulting from the utilization of the essential nutrients available to the body. Nutritional status may be good, fair, or poor, depending not only on the intake of dietary essentials but on the relative need and the body's ability to utilize them.

Physiological—relating to the normal vital processes of animal and vegetable organisms.

Precursor²⁰—a substance which is converted into another. For example, the carotenes are precursors of vitamin A.

Proteins²¹—nitrogenous compounds which yield amino acids on hydrolysis; essential constituents of all living cells, and the most abundant of the organic compounds in the body.

Protein, complete—one which contains all of the essential amino acids, i.e., those which must be supplied preformed in food.

Protein, incomplete—one which is completely lacking in one or more of the essential amino acids which must be supplied preformed in food.

Protein, supplementary effect²²—the ability of one protein to supply amino acids in which another protein is deficient, so that from the mixture of the proteins an adequate intake of amino acids is secured.

Provitamin²³—a substance which may be converted into a vitamin; thus, the carotenes are provitamins A.

Riboflavin, or vitamin B₂—vitamin of the B complex; soluble in water, not easily destroyed by heat but destroyed by visible light; a yellow pigment having a green fluorescence and essential for utilization of nutrients in the tissues.

Salt, iodized²⁴—table salt (sodium chloride) to which has been added one part per 10,000 of iodine as potassium iodide.

Starvation—long-continued unsatisfied hunger; the condition of suffering or dying from lack of food.

Thiamine, or vitamin B₁—vitamin of the B complex; soluble in water, destroyed by heat, essential for growth and the use of carbohydrate in the body.

Thyroid gland—a ductless gland lying in front of the upper part of the windpipe; furnishes an internal secretion which influences the rate of metabolism.

¹⁶ Sherman and Lanford, *op. cit.*, p. 15.

¹⁷ Turner, *op. cit.*, p. 129.

¹⁸ *Ibid.*, p. 130.

¹⁹ *Ibid.*, p. 130.

²⁰ Sherman and Lanford, *op. cit.*, p. 423.

²¹ Turner, *op. cit.*, p. 130.

²² *Ibid.*, p. 130.

²³ Sherman and Lanford, *op. cit.*, p. 423.

²⁴ Turner, *op. cit.*, p. 131.

- Tissue**—a collection of cells or derivatives of cells, forming a definite structure. Examples are *adipose* or *fatty tissue*, a structure consisting chiefly of fat droplets; *muscle tissue*, composed chiefly of long, thin fibers or muscle cells embedded in a thin, delicate connective-tissue membrane.
- Tissue, connective**²⁵—a tissue holding together and in place other, usually more active tissues, as, for example, muscle fibers or the cells of the glands.
- Tonus (tone)**²⁶—a sustained state of partial activity such as exists in varying degrees in live muscles at all times.
- Utilization of food**—(see Food.)
- Vitamins**²⁷—substances that are: *a*) distributed in foodstuffs in relatively minute quantities; *b*) distinct from the main components of food (i.e., proteins, carbohydrates, fats, mineral salts, water), *c*) needed for the normal nutrition of the animal organism, and *d*) the absence of any one of which causes a corresponding specific deficiency disease. At present about 20 vitamins are known; at least eight of them are known to be needed by man, or are of undoubted clinical significance.
- Vitamin A value**²⁸—the combined potency of a food or diet, represented by its content of vitamin A, carotene, and other plant precursors (of vitamin A).
- Vitamin B complex**²⁹—as originally used, this term referred to the water-soluble vitamins occurring in yeast, liver, meats, and whole-grain cereals, but some of the newer B complex vitamins, for example, folic acid and vitamin B₁₂, do not correspond to this distribution; includes a number of factors which have been identified, isolated, and synthesized, viz., thiamine, riboflavin, nicotinic acid, vitamin B₆, pantothenic acid, biotin, folic acid, inositol, and choline; vitamin B₁₂, which has been crystallized . . . and others which have been only partially demonstrated or unidentified.
- Vitamin C**—a water-soluble vitamin easily destroyed by exposure to the oxygen of the air; a white crystalline solid with a sour taste; concerned specifically with the maintenance of cement-like substances which hold cells together throughout the body; deficiencies are manifest in ruptured blood vessels, loose teeth, and poorly calcified bones.
- Vitamin D**—designates a group of fat-soluble factors which help to utilize calcium and phosphorus.
- Vitamin D milk**—(see Milk.)
- Vitamins, fat-soluble**³⁰—vitamins A, D, E, and K, which are extractable from foods with fat solvents.
- Vitamins, water-soluble**³¹—members of the B complex and vitamin C which can be extracted from foods with water as a solvent.

²⁵ Sherman and Lanford, *op. cit.*, pp. 419-20.

²⁶ *Ibid.*, p. 424.

²⁷ Leslie Harris. *Vitamins: A digest of current knowledge*. J. & A. Churchill Limited, London, p. 2, 1951.

²⁸ Turner, *op. cit.*, p. 132.

²⁹ *Ibid.*, p. 132.

³⁰ *Ibid.*, p. 133.

³¹ *Ibid.*, p. 133.

APPENDIX D

Method of Scoring Dietaries¹

DIRECTIONS FOR SCORING THE PUPIL FOOD RECORD

The score on a pupil's diet suggests the adequacy of the diet. Scores, however, are not infallible. The teacher should be constantly aware that she is evaluating the pupil's diet and not his *nutritional status*. For this reason caution should be exercised in referring to diets as "adequate" or "inadequate" since degrees of adequacy can be determined only by detailed clinical examination of the pupil, involving laboratory analysis. The improvement of pupil diets, however, is a sound and practical procedure and one in which teachers, parents, and pupils can participate. Dietary evaluation offers a useful method available to lay people for stimulating dietary improvement. Such evaluation not only indicates the strengths and weaknesses of the pupils' eating habits, but serves as an objective record against which change in these habits can be measured at subsequent intervals.

The directions which follow may appear overwhelming at first glance. They are written in minute detail, however, for the convenience of teachers who are entirely unfamiliar with this type of procedure. Tabulating the servings from the pupil's record onto the score sheet requires three to four minutes; scoring requires much less time than this, once the routine is established. Older pupils can be directed into doing their own tabulation; however, there is a distinct advantage to the teacher in making the tabulations herself for in so doing she is becoming better acquainted with the eating practices of her various pupils. If pupils do their own tabulating, the teacher should go over each record carefully.

¹ Reproduced by permission. Copyright General Mills, Inc., 1947.

The division of the standard into nine food groups is a modification of the "Basic Seven" which facilitates scoring and results in a more accurate evaluation.

Although the maximum score of 3 for each group is the same, there has been no effort to equalize the nutritive values of the nine groups. The concept here is very important; no diet is considered good unless it contains a high percentage of the recommended allowances of all food nutrients. These can be supplied by meeting the standards described on the score sheet, including the substitutions explained in the directions for scoring.

Directions for Tabulating the Number of Servings From the Pupil Food Record Onto the Score Sheet

1. Open the Pupil Food Record to the Sunday morning breakfast and look at the first food the pupil has listed.
2. Familiarize yourself with the amount of that food that is considered an *average serving* (See left-hand column on Score Sheet). Study these amounts carefully.
3. Estimate the number of servings, or proportion of a serving, represented by the first food on the list.
4. Tabulate this amount opposite the proper food group in the adjoining column labeled "number of servings." Then go on to the next food in the list. For example, study the illustrations in Figures 1 and 2.

Fig. 1. These are the Foods I Ate and Drank on Sunday

At *BREAKFAST* (name foods and give amounts, such as one egg):

1. *Milk* $\frac{1}{2}$ glass 5. _____
2. *Cooked cereal* 1 cup 6. _____
3. *Egg* 1 7. _____
4. *Toast* 1 slice 8. _____

The foods listed in the above record would be tabulated opposite the food groups as shown in Fig. 2.

Fig. 2. SCORE SHEET FOR THREE-DAY FOOD RECORD

Food Groups	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
5. Milk and milk products, fluid, evaporated, dried milk, or cheese Average serving: 1 c. fluid milk or 1 cu. in. cheese	$\frac{1}{2}$	none	three serv.	six serv.	nine serv.	5.	
7. Eggs (or egg custard) Average serving: 1 egg	1	none	one serv.	two serv.	three serv.	7.	
8. Bread, flour, cereals—whole grain or enriched Average serving: 1 sl. bread, $\frac{1}{2}$ c. cooked cereal, 1 c. prepared cereal, 1 griddle cake or waffle	///	none	three serv.	six serv.	nine serv.	8.	

5. Continue tabulating from breakfast, to midmorning lunch, to noon, etc. Do not skip from meal to meal over the three-day record searching out numbers of servings for any one group of foods. *To do so is likely to result in omissions and confusion.*
6. Foods that do not belong to any of the nine food groups are not tabulated. These will include such foods as pickles, popcorn, candy, soft

drinks, coffee, and the like, as well as cakes, cookies, ice cream, puddings, pies, and other desserts. Even though many of these desserts include various amounts of basic foods, it is the essence of good nutrition to provide first for the inclusion of basic foods as such rather than as so-called luxury foods.

7. After completing tabulation for pupil's three-day food record, examine Parent Survey Form.

Directions for Tabulating the Foods From the Parent Survey Form That the Pupil Had Opportunity To Eat, but Failed To Eat

1. Look at the first food the parent has listed. Find the food group on the score sheet to which this food belongs.
2. Tabulate *each serving* from Parent Survey Form with an "0" in the "Number of Servings" column opposite the proper food group. See Fig. 3. These "0's" represent the servings of foods that the child could have eaten, but failed to eat.
3. Continue tabulating each food in turn.
4. Foods that do not belong to any of the nine groups are not tabulated. (See item 6 above.)

Fig. 3. SCORE SHEET FOR THREE-DAY FOOD RECORD

Food Groups	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
1. Green and yellow vegetables—some raw, some cooked or canned Average serving considered: $\frac{3}{4}$ c. cooked or 1 c. raw	// 00	none	one serv.	two serv.	three serv.	1.	

To Obtain Pupil Score on Three-Day Food Record

1. Study the four ratings possible under the column labeled "Rating." See Fig. 4. Note that the highest rating any food group can receive is 3, regardless of the number of extra servings. Tabulations showing no servings at all for the three days rate "zero" in each food group. The number of tabulations worth a rating of "1," "2," or "3," however, varies in different groups. For instance, *one* serving of Green and Yellow Vegetables (Group 1) rates "1," whereas *two* servings of Other Vegetables and Fruits (Group 4) rate "1" and *three* servings of Groups 5, 8, and 9 rate "1." *Master this element of rating before proceeding.*
2. Begin with Group 1. Count the number of tabulations from the pupil record in the "Number of Servings" column. (Ignore at this stage tabulations of "0's" from Parent Survey Form.) In Fig. 4 there are 5 servings tabulated for Group 1.
3. Calculate (by inspection) the rating this number of servings would receive for Group 1. Five servings in Group 1 would receive the full rating of 3, with two extra servings to spare. Extra servings are discussed later.
4. Place this rating in the column labeled "Pupil Score" opposite Group 1. See Fig. 4.
5. Do the same for Group 2.

NOTE: Dietary standards intended for popular use are set up in terms of definite foods or food groups; yet it is commonly understood that our

recommended allowances of food nutrients can be derived from a *variety* of sources. This score sheet makes possible several substitutions from one food group to another. This is a distinct advantage. The greater accuracy in classifying diets, when these substitutions are provided for, more than compensates for the increased difficulty in scoring.

6. More than three servings in Group 1 or 2 can be counted as servings for Other Vegetables and Fruits, Group 4, if this group has less than the recommended number of servings, six, for a full rating. This is shown with an arrow leading down to Group 4 with the number of extra servings marked at the end of the arrow. See Fig. 4. Green and yellow vegetables are particularly important for vitamin A value and the Citrus Fruit Group for ascorbic acid content. Extra servings from these two groups can substitute for servings of "other fruits and vegetables," but extra servings of "other fruits and vegetables" cannot take the place of servings from Groups 1 or 2.
7. If Group 3, Potatoes, has fewer than three servings tabulated, look at the tabulations in Groups 8 and 2. If there are more than nine servings of cereal foods tabulated in Group 8 *and* at least three servings tabulated in Group 2, the extra servings of cereal foods can substitute for potatoes, serving for serving. Cereal foods — enriched, restored, or whole grain — Group 8, are valued for at least three of the B vitamins and iron. Foods from Group 2 are valued for their ascorbic acid content. Potatoes are not valuable sources of the protective nutrients in cereal foods, but, like the foods in Group 2, they do carry ascorbic acid. Unless there are three servings tabulated for Group 2, do not make this substitution.
8. Observe that Groups 5, 8, and 9 require three, six, and nine servings to rate "1," "2," or "3" respectively. In these groups, tabulations of four or five servings rate only "1" and tabulations of seven or eight servings rate only "2."
9. If Group 9, Butter or Fortified Margarine, has fewer than nine servings tabulated, look back to the tabulations for Milk, Group 5. Milk is especially important for calcium, protein, riboflavin (a B vitamin) and vitamin A. Of these nutrients in milk, butter or fortified margarine is valuable only as a source of vitamin A. Because of the higher vitamin A content of milk, one extra serving of milk can count as *three* servings of butter or fortified margarine. Note in Fig. 4 that milk has eight servings tabulated. Since there are more than six servings (deserving a rating of "2") but fewer than nine servings (which would deserve a rating of "3"), these two extra servings of milk can substitute for six servings in the butter group; otherwise the contributions to the diet of the servings of milk beyond the "2" rating, but not equal to the "3" rating, would be denied in the over-all score.
10. Extra servings in Group 6 can substitute, serving for serving, for Eggs, Group 7, provided there are at least three servings in Group 5. Meat can substitute for eggs except for higher vitamin A value of eggs. If this value is taken care of through at least three servings of milk, the substitution is nutritionally safe. If Group 5 does not show at least three servings tabulated, do not make this substitution.

SCORE SHEET FOR THREE-DAY FOOD RECORD

**Based on recommended allowances for elementary school children (1).
(See Supplementary Directions for Scoring Food Records.)**

Pupil Record No. _____ Name _____ Grade _____ Date _____

School _____ Classification of diet*: Good Fair Poor (Circle one)

Food Groups (2)	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
1. Green and yellow vegetables—some raw, some cooked or canned Average serving considered (3): $\frac{1}{2}$ c. cooked or 1 c. raw		none	one serv.	two serv.	three serv.	1.	
2. Oranges, tomatoes, grapefruit, raw cabbage, or salad greens Average serving: 1 orange, $\frac{1}{2}$ grapefruit, 1 tomato, 1 c. raw greens, $\frac{1}{2}$ c. cooked tomato, $\frac{1}{2}$ c. juice		none	one serv.	two serv.	three serv.	2.	
3. Potatoes Average serving: $\frac{1}{2}$ c. cooked		none	one serv.	two serv.	three serv.	3.	
4. Other vegetables and fruits, raw, dried, cooked, or canned Average serving: $\frac{1}{2}$ c. cooked		none	two serv.	four serv.	six serv.	4.	
5. Milk and milk products, fluid, evaporated, dried milk, or cheese Average serving: 1 c. fluid milk or 1 cu. in. cheese		none	three serv.	six serv.	nine serv.	5.	
6. Meat, fish, poultry, dried beans or peas, nuts, or peanut butter Average serving: 2 or 3 oz. meat, 4 tbs. peanut butter, 4-8 nuts, $\frac{1}{2}$ c. cooked beans or peas		none	one serv.	two serv.	three serv.	6.	
7. Eggs (or egg custard) Average serving: 1 egg		none	one serv.	two serv.	three serv.	7.	
8. Bread, flour, cereals—whole grain or enriched Average serving: 1 sl. bread, $\frac{1}{2}$ c. cooked cereal, 1 c. prepared cereal, 1 griddle cake or waffle		none	three serv.	six serv.	nine serv.	8.	
9. Butter or fortified margarine Average serving: 1 teaspoon		none	three serv.	six serv.	nine serv.	9.	
Total Score							

* To classify total score:

1. If score on milk (Group 5) is 0, the diet is considered **POOR**, regardless of total score.
 2. If total score is 22 or above, *and score on milk is 2 or 3*, the diet is considered **GOOD**.
 3. If total is between 19 and 21 inclusive, and the score on milk is at least 1, the diet is considered **FAIR**.
 4. A score of 18 or below is considered **POOR**.
- (1) For children 7 to 9 years of age, a score of *good* gives above 80% of the recommended daily allowances; *fair*, 61% to 80%; and *poor*, 60% or below, as recommended by the Food and Nutrition Board, National Research Council, Washington, D. C., September, 1945.
- (2) Food groups and recommended number of daily servings adapted from *Nutrition Education in the Elementary School*, Federal Security Agency, U. S. Office of Education, in cooperation with U. S. Department of Agriculture, August, 1943, p. 4.

- (3) Amounts considered as average servings adapted from *Menu-Planning Guide for School Lunches*, W.F.A., NFC-10, Revised, September, 1944, pp. 2-3, and "Food Composition Table for Short Method of Dietary Analysis," Donelson, Eva G., and Leichsenring, Jane M., *Jour. Amer. Diet. Assn.*, 18:429-39, 1942. (Revised March 1, 1945.)

This score sheet and accompanying Food Survey Forms developed by Willa Vaughn Tinsley, graduate student in Home Economics Education, under the direction of Clara Brown Arny and Jane M. Leichsenring, University of Minnesota.

APPENDIX E

Lesson Plans for Using Six Nutrition Films

TITLE: *Something You Didn't Eat*¹

Before showing the film, give each student the score for his dietary. A perfect total score is 27, with each food group scoring 3. A score of less than 3 shows which groups of food the student did not eat in sufficient quantity. Reference will be made to individual scores in the questions following the showing of the film.

Ideas Developed in the Film

This film is a Walt Disney cartoon that illustrates in several ways the consequences of having inadequate quantities of certain groups of foods. It shows some early discoveries of the importance of (a) citrus fruits as cures for scurvy and (b) whole grains as cures for beri-beri. The results of poor diets for modern men and women are shown in an amusing manner, as are ways of securing adequate diets.

Questions To Answer When Viewing the Film

1. Why did men in the film become ill?
2. What foods cured the men who were ill?
3. How did the man and woman in the film show that their diets were inadequate?

Questions for Discussion After Viewing the Film

1. Why do we need food from each group in our diets every day?
2. Look at average scores for the diets of the students in our class.

¹ Published by Motion Picture Service, USDA, Washington, D. C.

- a. For which food groups is our rating *good*?
 - b. For which food groups do we rate *fair*?
 - c. For which food groups do we rate *poor*?
 - d. How does your individual score compare with the class score? (A score of 1 for a food group is *poor*; 2 is *fair*; 3 is *good*.)
3. What may happen if we do not have the foods for which we rated *poor* and *fair* in our diets?

TITLE: *Fundamentals of Diet*¹

Ideas Developed in the Film

The introduction shows how young animals secure their first food. Rat-feeding experiments show what happens to animals that do not have sufficient quantities of protein, minerals, or vitamins A and D in their diets.

Questions To Answer When Viewing the Film

1. Why were white rats used for the feeding experiments?
2. What happened to the rat that did not get enough (a) protein, (b) minerals. (c) vitamin D, (d) vitamin A?

Questions for Discussion After Viewing the Film

1. Why did the rats need certain foods in their diets every day? To answer this question recall what happened to the rats and guinea pigs.
 - a. Why did the eyes of one rat become red and sore? What could he have eaten to help prevent this?
 - b. Why was one guinea pig larger and stronger than the other?
2. How are our needs similar to those of white rats? How are the nutritional needs of rats different from ours? (They grow 30 times as fast.)
3. Show a Basic Seven chart. Why are foods divided into these seven groups? What may happen if we do not eat some foods from each of these groups?
4. During the year when there is little sunlight we need foods that are rich in vitamin D. Which group of foods is the best source of vitamin D? (See *A Nutrition Guide*,² pages 3 and 9, for discussion of vitamin D.)
5. Study the report of the food for which our class rated *fair* or *poor*. Which foods did we learn about today?

TITLE: *More Life in Living*³

Ideas Developed in the Film

This film shows the effects of good and poor diets on general health, weight, and personality. The relationship between health and ability to participate in active sports is emphasized.

Questions To Answer When Viewing the Film

1. What did the boy who couldn't make the team eat?
2. What should he have eaten?
3. Why were these foods recommended?

¹ Published by Encyclopedia Britannica Films, Inc., Wilmette, Ill.

² *A Nutrition Guide*, Dept. Pub. Serv., General Mills, Inc., Minneapolis 1, Minn.

³ Published by Dept. Program Serv., National Dairy Council, 111 N. Canal St., Chicago 6, Ill.

4. Notice the different types of people in the film and try to remember what each of them ordered in the restaurant.

Questions for Discussion After Viewing the Film

1. Did the foods eaten by the people in the film seem to be related to the way the people looked or acted?
 - a. The fat girl?
 - b. The nervous woman?
 - c. The boy who couldn't make the team?
 - d. The family?
2. What foods should you eat each day if you want to be attractive?
 - a. To have good teeth?
 - b. To have good posture?
 - c. To have pep?
3. What foods should you eat sparingly if you are fatter than you want to be? (For older pupils.)
4. What foods should you eat if you want to gain weight?
5. What foods should be eaten by all of us *every day*, regardless of our weight? (This question is intended to emphasize the importance of milk and cheese; eggs, meat; green or yellow vegetables; tomatoes, raw cabbage, oranges, or grapefruit.)

TITLE: For Health and Happiness¹**Ideas Developed in the Film**

This film shows healthy children from infancy through adolescence, with emphasis upon individual differences. It also emphasizes the relationship between a good diet and attractive personal appearance or ability to participate in activities. Characteristics of healthy bone structure, lung or chest capacity, muscular parts of the body, and good coordination are pointed out. (Teacher should tell students that small children are filmed with little or no clothing to better show the signs of a well-developed healthy body.)

Questions To Answer When Viewing the Film

1. How were the healthy boys and girls alike (a) in appearance? (b) in their abilities and pleasure in sports and play?
2. What foods did each of them eat every day?

Questions for Discussion After Viewing the Film

1. Describe a healthy baby.
2. How did the healthy babies and healthy boys and girls differ in appearance? How were they alike?
3. Point out on a basic food chart the foods they ate every day.
4. For which of these food groups were you rated *good* for your three-day record? Which foods do you need in larger quantities?
5. Do you believe that the foods you eat influence the amount of fun that you have?

¹ Published by Motion Picture Service, USDA, Washington, D.C.

TITLE: *Whenever You Eat*¹**Ideas Developed in the Film**

This film shows attractive high school boys and girls who are ambitious to succeed in such occupations as engineering, music, nursing, aviation, home-making, and landscape architecture. Farming is not one of the occupations shown but many of the abilities emphasized are needed in farming. Some characteristics needed for each of these occupations are given and related to good health.

Menus for one day without milk, cheese, or butter are shown. A chart of food nutrients shows how these three meals fail to provide as much of each nutrient as is needed. When milk, cheese, and butter are added, more than the needed amounts of some nutrients are provided.

Questions To Answer When Viewing the Film

1. What skills that were shown in the film are needed by farmers?
2. How does the lunch served at our school differ from the one shown in the film?
3. How do milk, cheese, and butter improve the three meals that are shown in the film?

Questions for Discussion After Viewing the Film

1. What work do you want to do when you finish school? How will your health influence success in the occupation you have chosen?
2. How did your three-day dietary fail to meet the standard recommended? How might lack of these foods affect your appearance, coordination, pep, and energy?
3. Using the school lunch menu for today, plan the other meals for the day. Check your menus against the nine food groups as given on the *Score Sheet for Three-Day Food Record*.² (The score sheet should not be given to pupils. The foods as listed in the left-hand column can be studied either on a wall chart or from a list on the board.)
4. When are we old enough to accept responsibility for our own health?

TITLE: *What Makes Us Grow*³**Ideas Developed in the Film**

This film was made during World War II and emphasizes the importance to our country of the health of every one of us. The importance of each type of food in our meals is pointed out.

Questions To Answer When Viewing the Film

1. How do the two foods for which our class scored lowest differ in nutrients from other foods?
2. Why should each one of us include these foods in his diet every day?

¹ Published by Dept. Program Serv., National Dairy Council, 111 N. Canal St., Chicago 6, Ill.

² See Appendix D, p. 192.

³ Published by National Film Board of Canada, 1270 Avenue of the Americas, New York 20, N.Y.

Questions for Discussion After Viewing the Film

Place on the board the classification of food groups for which our class rated *good*, *fair*, or *poor*, given in the right-hand space of each summary sheet, and also the average score for each food group.

Check with students on their reports of use of butter or margarine. Each student should eat 3 teaspoonfuls a day, either as a spread or on vegetables. (We suspect that all butter consumption is not reported.)

1. Why are each of the food groups for which we rated *fair* or *poor* important in our diets?

Research has shown that eggs are important as a separate group from meat, poultry, and fish because the protein is particularly well utilized and the yolks of eggs provide vitamins that are not always found in meat, poultry, and fish. The yolk of the egg has been called "an over-sized vitamin pill."

2. What foods are classified under each of these food groups? (See Appendix A, page 173.)
3. How many of these foods do you eat every time they are served to you?
4. Are you refusing, at home or at school, most of the foods from a particular group?
5. As a class, which of these foods might we agree always to try to eat when they are served to us?

APPENDIX F

Care, Feeding, and Characteristics of Rats

GENERAL INSTRUCTIONS

Keeping records

If possible, secure white rats of weanling age (28 days). Be sure that cages are ready when rats arrive. Before the experiment begins, record each rat's age, weight, sex, and the diet you have planned for each one. Put this information on a label on each cage.

At the beginning of the experiment, establish a certain time to record information. It may be daily, two or three times a week, or weekly. Records should be made *at least* once a week.

Once a week discuss and analyze these records with students. After a week or two, students should be able to predict future progress or regression of rats. Stress the importance of keeping accurate figures.

Graphs are the easiest way to illustrate the weight and growth of rats. It is important to keep records so that students may see the relationship between food and growth.

Younger students will understand weight in terms of ounces and pounds. Older students may use grams as weight measurement.

Handling Rats

Rats respond to gentle handling. To pick up a rat, extend hand slowly toward rat's head. Hold it by placing thumb and forefinger under the rat's chin.

Poorly nourished rats are more irritable and may snap at fingers. It is wise to handle them with gloves. Explain to students that quick movements or pushing objects into cages may frighten the rats.

Set up a schedule with students so that there is a rotating plan for weighing rats, feeding rats, cleaning cages, and other details.

Feeding Rats

The main purpose of using white rats is to show the effects of diets of different natural foods which are commonly used in human dietaries. The experiments are planned to illustrate the importance of good food selection as shown by growth and external appearance.

This experiment includes three diets of natural foods which give striking results in growth and appearance of animals. The three diets are used to illustrate:

1. Effects on growing animals of diets completely lacking in milk and eggs, and inadequate in fruits and vegetables (Diet 1).
2. Effects of feeding the inadequate Diet 1 plus milk only (Diet 2).
3. Effects of feeding a fully adequate diet (Diet 3).

PERCENTAGE COMPOSITION OF 3 EXPERIMENTAL DIETS

Ingredients	Diet 1 (all foods dried) Inadequate	Diet 2 (all foods dried) Inadequate plus milk	Diet 3 (all foods dried except last 3) Adequate
	%	%	%
Meat	15	15	15
Beans (navy)	4	4	4
Potatoes (white)	10	10	10
Rolled oats	5	5	5
White flour	25	20	12
Butter	5	5	5
Lard	10	10	6
Sugar	20	10	5
Apples	5	5	5
Salt	1	1	1
Dried whole milk	0	15	15
Eggs	0	0	5
Lettuce	0	0	3
Carrots	0	0	4
Tomatoes	0	0	5
Total	100	100	100

Permit the rats on all 3 diets to eat as much as they desire. Be sure that they have plenty of food and water *at all times*. Give fresh food and water daily, except for week ends (see Week-end Care, page 201). Remove foods not consumed.

Weighing Rats

Use balance gram scale if possible. Otherwise, use a small scale which records ounces. Check scale before weighing. Weigh container which is to hold rat. Then put rat into weighed container. Weigh container with rat in it. Subtract weight of container from total weight to obtain weight of rat.

Daily Cleaning of Cages

Each day, change newspaper in bottom pan of cages. Check, too, to be sure food containers are clean.

Weekly Cleaning of Cages

Wash cages weekly (CLEAN ONLY ONE CAGE AT A TIME — TO PREVENT MIX-UP)

1. First put rat into coffee can and cover with screen or other material which admits air.
2. Clean cage, base, and cover in soap and water with mild disinfectant. Scrub with brush. Be sure food and water containers are clean. Rinse thoroughly.
3. Clean cupboard or other area which holds supplies for rats. Check to see that all needed supplies, cleaning equipment, and foods are available.

Handling Cages in Classroom

1. Keep cages in a place that will be good for the rats. They need light and air. Keep cages away from drafts. Keep rats away from *direct* light, in a quiet place, so they will not become nervous and excited.
2. Keep rats in a place where they can be observed but not where they will draw attention away from other studies.
3. Keep cages in a place where they will not be knocked over.
4. Be sure that rats are always returned to the proper cage. In the beginning, the rats will be about the same size and weight. It may be hard to tell them apart. Each cage will have an identifying card. When cleaning cages, remove only one rat at a time.

Week-end Care

Arrange with the janitor to find a place in the building which will be warm enough for the rats. They should have a temperature of about 70 to 80 degrees Fahrenheit. (Rats should be in a place where there is no danger of their being fed or handled by other people.) Just before the rats are placed in their week-end location, check to be sure each rat has plenty of food and water and is properly covered. Enough food should be provided so that some remains uneaten the following Monday morning.

Early Monday morning, return the rats in their cages to the classroom. Clean the cages.

Characteristics To Note in Rats

Well-Nourished Rat:

Smooth, glossy coat
Bright pink eyes
Pink nose, feet, tail
Smooth tail, free from roughness
Quick, alert movements
Easily handled, good-natured
Clean, tidy habits

Poorly Nourished Rat:

Shaggy, dull, possibly thin coat
Crusty, speckled eyelids
Rough, dry, scaly ears, feet, tail
Humped posture
Pinched face
Nervous, irritable, restless
Susceptible to "sniffles"

