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ABSTRACT

This instructional module has three main goals: (1) to establish the need and functionality of behaviorally stated objectives, (2) to establish a common functional language by which to describe behavior, and (3) to generate ability to construct specific descriptions of the expected student performance. An underlying purpose of this module is to emphasize the importance of instructional experiences for students being directed toward intentional, observable behavior change. The general pattern of instruction is one of presenting the situation with as little instructor-direction as possible. Because of the diagnostic data available in the pre-appraisal experience, it is possible to determine which instructional sequence appears to be most appropriate for which student. The instructional format includes: Materials List, Pre-Appraisal, Instructional Activities (with approximate time for each), and Post-Appraisal. Also included in this module are: Performance Objectives for the Module, Rationale for the Module, References and Duplicated Materials. The population for which this instructional program has been found to be effective includes preservice and inservice elementary school teachers. (BR)

STATING INSTRUCTIONAL OBJECTIVES

1st Experimental Edition

The Research & Development Center
For Teacher Education

THE UNIVERSITY OF TEXAS
AUSTIN

STATING INSTRUCTIONAL OBJECTIVES

1st Experimental Edition

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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STATING INSTRUCTIONAL OBJECTIVES

David P. Butts

Science Education Center
and
The Research and Development Center for Teacher Education
The University of Texas at Austin

I. PERFORMANCE OBJECTIVES:

At the end of this session the individual should be able to:

1. Distinguish between a behaviorally stated instructional objective and a non-behaviorally stated objective.

2. Identify an action word appropriate to a given behavior.

3. Distinguish from a list of behaviorally stated objectives those which are adequate from those which are inadequate in regard to context description.

4. Construct an adequate behavioral objective appropriate to a given instructional activity.

II. RATIONALE:

Instructional objectives stated in terms of observable -- and hence measurable -- behavior provide the basis for intentional change. Behavioral objectives communicate to the teacher specific outcomes or performances which a student is expected to achieve at the end of a particular lesson or set of lessons.

Behavioral objectives also provide the basis for decision-making with regard to instructional activities, instructional sequence, assessment, and student grouping arrangements.

A behaviorally stated objective is not only directed toward a specific and clearly defined goal, it also requires some type of performance from the student. Considering these parts of a behaviorally stated objective, it will include:

1. the subject,
2. the action or behavior,
3. the context or "scene" of the expected behavior which will vary as different subjects are taught.

In this module, then, are three main goals: first is to establish the need and functionality of behaviorally stated objectives; second, to establish a common functional language by which to describe behavior; third, to generate ability to construct specific descriptions of the expected student performance.

The common "action" language is that which has been developed and defined by the writers of Science - A Process Approach. These nine action verbs have been extended beyond their original intent in science instruction in the elementary school to other subject areas, such as reading, mathematics, and social studies. By using these nine action words or phrases, not only are the ranges of expected student performance included -- but also specific instructional procedures suggested. Consider, for example, the contrast between students being taught to name an object or order a group of objects. Though objectives may be stated behaviorally by other than these specific verbs, there is an economy in using these nine verbs, which seem to include those behaviors observable in most learning activities.

An underlying purpose of this module is to emphasize the importance of instructional experiences for students being directed toward intentional, observable behavior change.

The population for which this instructional program has been found to be effective includes pre-service and in-service elementary teachers who teach both science and other subjects.

The instructional activities of the module are based on the sequence illustrated in Figure 1.

The general pattern of instruction in this module is one of presenting the situation with as little instructor-direction as possible. The participants will spend much of their time in this program filling in blanks or listening to short frames on a filmstrip. The sequence provides illustrations of how the instructor can guide the discussion toward a meaningful interpretation of the experiences presented.

Because of the diagnostic data available in the pre-appraisal experience, it is possible to determine which instructional sequence appears to be most appropriate for which student. Experience indicates that if 80 percent of a group performs well

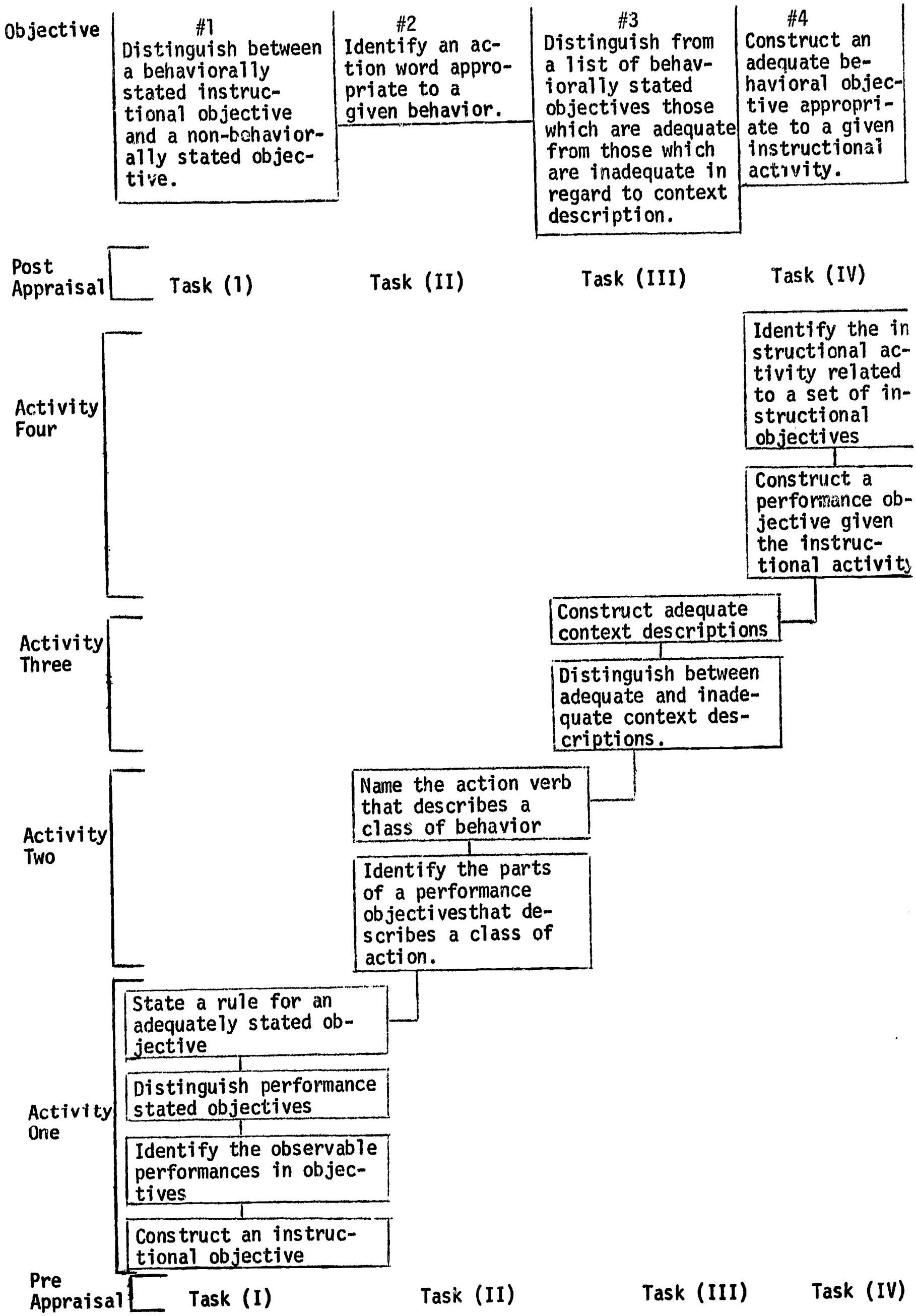
Objective
#1
Distinguish between a behaviorally stated instructional objective and a non-behaviorally stated objective.
#2
Identify an action word appropriate to a given behavior.
#3
Distinguish from a list of behaviorally stated objectives those which are adequate from those which are inadequate in regard to context description.
#4
Construct an adequate behavioral objective appropriate to a given instructional activity.
Post Appraisal
Task (1)
Task (II)
Task (III)
Task (IV)
Activity Four
Identify the instructional activity related to a set of instructional objectives
Construct a performance objective given the instructional activity
Activity Three
Construct adequate context descriptions
Distinguish between adequate and inadequate context descriptions.
Activity Two
Name the action verb that describes a class of behavior
Identify the parts of a performance objectivesthat describes a class of action.
Activity One
State a rule for an adequately stated objective
Distinguish performance stated objectives
Identify the observable performances in objectives
Construct an instructional objective
Pre Appraisal
Task (I)
Task (II)
Task (III)
Task (IV)

Figure 1

on an appraisal task, the related instructional activities should be omitted. For this instructional module, this is illustrated as:

Objective	Appraisal Task	Instructional Activity
1	I	1
2	II	2
3	III	3
4	IV	4

Evaluation Data:

The results of students involved in the instructional experience as described in this module are as follows:

The time periods required for this instructional module included:

A. Planning for instruction: Average - 6 hrs.
(Range: 5 to 8 hours)

B. Teaching: Average - 2 hrs.
(Range: 2 to 5 hours)

Suggested time periods for the module are as follows:

A.	Pre-Appraisal	25 minutes
B.	Activity 1	20 minutes
C.	Activity 2	10 minutes
D.	Activity 3	20 minutes
E.	Activity 4	20 minutes
F.	Post-Appraisal	25 minutes
	TOTAL	120 minutes

III. REFERENCES:

Atkin, J. Myron, "Behavioral Objectives in Curriculum Design: A Cautionary Note," The Science Teacher, 35:5, May, 1968.

Butts, D.P. and Montague, E.J., "Behavioral Objectives," The Science Teacher, 35:3, March, 1968.

Gagne, R.M. "The Psychological Basis of Science - A Process Approach," AAAS Misc. Publ. 65-8, 1965, 35 pages.

Gagne, R.M. "The Conditions of Learning." New York, New York: Holt, Rinehart, and Winston, Inc., 1965, 308 pages.

Mager, R.F. Preparing Instructional Objectives. Palo Alto, California: Fearon Publishers, 1962, 62 pages.

IV. MATERIALS LIST:

Pre-Appraisal	SO #1 (1 per participant)
Activity 1	Aquarium transparency (1) Chalkboard and chalk, or Chart paper and pen Filmstrip projector and Filmstrip Tape recorder and Tape SO #2 (1 per participant) SO #3 (1 per participant)
Activity 2	SO #3 (1 per participant) SO #4 (1 per participant) SO #5 (1 per participant)
Activity 3	SO #6 (1 per participant) Packet A - Includes colored paper cut outs - 3 different size triangular shapes, 3 different size square shapes, 1 ellipse, plus miscellaneous shapes.
Activity 4	SO #7 (1 per participant)
Appraisal	SO #8 (1 per participant)

V. INSTRUCTIONAL ACTIVITIES

Pre-Appraisal (Approximate time: 25 minutes)

(Directions: Distribute copies of SO #1)

1. This activity will provide an opportunity for checking up on your objective-stating ability. Take 10-15 minutes to use the sheets you have.

After the group has had 15 minutes to work on the Pre-Appraisal,

2. Let's check Task I.
   - If you have #6 and 9 marked, circle Task I.
   - If you have #1 and 2 marked adequate for Task II and #3, 4, and 5 revised, circle Task II.
   - If you have the three words - Identify, Demonstrate, and Name - circle Task III.
   - If you have two objectives similar to these - "the learner will be able to identify shapes which have symmetry" or "the learner will demonstrate that objects may be folded in more than one way to show symmetry" - circle Task IV.

You may wish to use a discussion of a task as the introduction to those activities you will now use, or you may wish to discuss briefly those points that need clarification before proceeding with the instructional activities that most of the group appear to need.

Activity 1 (Approximate time: 20 minutes)

Objective 1: Distinguish between a behaviorally stated instructional objective and a non-behaviorally stated objective.

(Directions: Show aquarium transparency to group

3. Suppose you are developing a lesson plan in which these materials illustrated on the transparency are to be used. Write an instructional objective for the lesson plan.

The materials include a transparency of an aquarium: sand, shells, rock castle, air bubbler, heater, black mollies, guppies, goldfish, and three varieties of plants. The context you are providing will give the participants the opportunity to display immediately their performance ability -- plus it will focus attention on the topic of objectives.

4. Identify an individual. "_____. please read your objective.

As the objectives are read by four or five of the participants, either you or a member of the group should write three or four of them on the board or chart paper. As the objectives are being described, note to yourself the individual participant's competence in stating specific performance objectives. If the group seems to be stating objectives in terms of performance you should at this point have them describe for you the parts of a behavioral objective (subject, action verb, and context) and the rationale for stating them in this manner. If the group's performance indicates the need for further instruction, proceed with the outline.

(Directions: Use SO #2 with the filmstrip. Use only the first 11 questions of the filmstrip.)

5. In order to decide how to use instructional materials, a frame of reference is necessary. This filmstrip incorporates one basis for deciding. Be sure to mark your answers as directed by the tape recording.

The filmstrip pinpoints the need for and the general frame of reference for the behaviorally stated objective. It is not limited to the teaching of science but is applicable to many subject areas and includes illustrations from many disciplines. NOTE: If you have some participants who have seen this filmstrip, provide them with the option of being excused for the next 8-10 minutes. The tape supplies the correct responses.

6. How will you know when your objective has been accomplished?

Select one of the vague objectives and have the participants describe what they would expect to see children doing if they had, for example, "understood a balanced environment." Note on the board the specific behaviors they would include under this idea of "understand." You may also wish to note <u>how many</u> alternative ideas are expressed by the group.

(Directions: Use SO #3.)

7. On this sheet are a number of instructional objectives. Place them under two headings which state the basis of your grouping.

You may wish to note that these objectives have been taken from actual lesson plans. Note that there are many possible ways of grouping. If you want the participants to believe that you are interested in <u>their</u> ideas (rather than just the single answer you have in mind), accept their basis as one means for grouping the objectives. One of the bases for grouping that you may anticipate is that of specific vs. vague or behavioral vs. non-behavioral. If this is not suggested, state that:

8. Objectives #2, 5, 6, 7, 9, 10, 11, 16 are all alike in some way and are different from the others. What are the characteristics common to this group of objectives?

With this clue, the group should quickly identify the common characteristics, i.e., specific descriptions of behavior.

9. Based on this experience, state a rule that distinguishes a behavioral from a non-behavioral objective.

In the rule, you may wish to use the analogy between a behaviorally stated objective and the parts of a sentence which is as follows:

A sentence has a subject--in a behavioral objective, that is the learner.

A sentence has an action word--in a behavioral objective, that is the action word.

If it is an active verb, then it has an object of the verb--in a behavioral objective, this is the specific context of the scene of the action.

Activity 2 (Approximate time: 10 minutes)

Objective 2: Identify an action word appropriate to a given behavior.

10. The next set of activities will help us with two of these three parts of a behaviorally stated objective. What is the subject of an instructional objective?

Many ideas may be expressed. By this time the participants should be in agreement, however, that the subject of any performance objective is the performer. The performer of interest is not the teacher, but the student. Hence the subject of any behavioral objective is "the student."

11. What word in a sentence denotes action?

The verb is the obvious answer.

12. Look back at SO #3. Underline each of the verbs in the objectives. In what way are the verbs of the behavioral group different from the non-behavioral group -- or are they?

There may not be complete agreement among all participants as to the common meaning of the behavioral words. However, it should be clear that there is more agreement as to what action is anticipated with the behavioral than with the non-behavioral groups.

13. The next set of activities is designed to help us develop a common language by which to describe student performance.

You may wish to note that a common language not only helps to specify anticipated student performance for us as individuals, but it also helps us in communicating our ideas with others.

(Directions: Use SO #4.)

14. Fill in the blanks on SO #4. Which verbs call for non-verbal behavior? Which call for verbal behavior?

The acceptable responses on SO #4 are:

1. Construct
2. State a rule
3. Name
4. Describe
5. Apply a rule
6. Identify
7. Demonstrate
8. Order
9. Distinguish

The non-verbal words are:

Identify, demonstrate, order, construct, apply a rule, distinguish

The verbal ones are:

Name, describe, state a rule

(Directions: Use SO #5.)

15. Now complete the sheet using the action verbs on SO #4.

Acceptable responses are:

1. Identify
2. Name
3. Demonstrate
4. Order
5. Construct
6. Describe
7. State a rule
8. Apply a rule
9. Distinguish

Activity 3 (Approximate time: 20 minutes)

Objective 3: Distinguish from a list of behaviorally stated objectives those which are adequate from those which are inadequate in regard to context description.

(Directions: Use SO #6.)

16. Here is another set of instructional objectives. There are several ways in which they can be grouped. Please make two groups of them and be prepared to name the basis of your grouping.

One of the ways in which the objectives may be grouped is based on how specific the context is described. Just as the action is needed to be specific, so is the "scene" of the action. This activity permits you to diagnose the participant's ability to recognize the need for a specific context.

17. What was your grouping and its basis?

Accept all answers from the participants. You may wish to have one give his grouping and another attempt to describe the reason why that grouping belongs together. If no one suggests items 1, 4, 6, 7, 9, and 10, have the participants identify the way in which all of these are alike and not like the others.

(Directions: Use Packet A shapes.)

18. If I ask you to order this set of objects, what will you do?

Although I've used a behavioral word, the participant cannot act until he secures more information.

19. Now try this. Use the set of objects and construct a classification based on shape.

The participants should be able to perform acceptably.

20. In what way were these tasks different?

One specified the basis of knowing when the learner had been successful and the other one did not.

21. Reword objectives 2, 3, 5, and 8 so that they are adequate.

The key here is to have the objectives specific. They might be as follows:

2. Construct a classification of objects based on color and texture.

3. Identify an object using shape and color.

5. Distinguish between temperatures that vary 5°C using a thermometer.

8. Identify a member of a set of birds.

Activity 4 (Approximate time: 20 minutes)

Objective 4: Construct an adequate behavioral objective appropriate to a given instructional activity.

(Directions: Use SO #7.)

22. I will now describe an instructional activity. Write down what you think is one instructional objective for that activity.

An acceptable objective for Activity A is number A, for Activity B--number B, for Activity C--number C, for Activity D--number D.

A. The learner will identify the following colors by sight: yellow, orange, red, purple, blue, and green.
B. The learner will identify other colors as being like one of the colors, yellow, red, or blue.
C. The learner will order objects by lifting them.
D. The learner will construct a bar graph.

23. You may now wish to have the participants review some of the Overviews of previous modules and how the objectives are related to exercises. Additional skill can be developed by specifying which activity of which exercise goes with which performance objective.

Appraisal (Approximate time: 25 minutes)

(Directions: Use SO #8)

24. To check up on how you have done, here is an Appraisal activity. You will have 10-15 minutes. At the end of that time, we 'll go over the acceptable responses.

Ten to fifteen minutes is usually a sufficient time period for this activity. At the end of that time, go over the answers. If you intend to use the papers as feedback on the session, caution the participants to use a different color pen or pencil when they make any notations in the margins.

It is usually helpful to review their responses on the post-appraisal and clear up any points of confusion.

Duplicated Materials -- Without Answers

SO #1

Code_____

Stating Instructional Objectives

Pre-Appraisal

Task 1: Place an X before any of the following instructional objectives which are acceptably stated.

1. ____ The student will grasp the significance of the Treaty of Versailles.

2. ____ The student will have an attitude favorable to English grammar interpreted by his response to a questionnaire.

3. ____ The student will know six verbs.

4. ____ The student will learn the names of the common tools in wood shop.

5. ____ The teacher will list three major causes of the Civil War on the chalkboard.

6. ____ The student will demonstrate the threading of a sewing machine.

7. ____ The student will pay attention as the teacher demonstrates the use of the lathe.

8. ____ The student will develop a sense of the cultural unity of man.

9. ____ The student will name and describe the themes of four of Shelley's poems.

10. ____ The child will develop interest in leisure sports.

Read the instructional activity described below:

Show the children some shapes. Ask them to identify those which are symmetrical and those which are nonsymmetrical. Ask several children to demonstrate where the shapes might be folded to show their symmetry.

Ask the children to name those shapes which are symmetrical with respect to more than one line and to demonstrate this symmetry by folding.

Task 2: Write the action words used above to describe student behavior.

Task 4: State the performance objectives of the instructional activity given above.

Task 3: Mark each objective as adequate or revise it so as to be adequate.

Adequate ____ 1. At the end of the lesson the learner will name the three principal colors: yellow, red, and blue.

Revision _____

_____

Adequate ____ 2. After the activity the learner can distinguish between objects which have an odor and those that do not.

Revision _____

_____

Adequate ____ 3. After carrying out this lesson, the learner should be able to identify tastes.

Revision _____

_____

Adequate ____ 4. At the end of the exercise the child should be able to order sets very quickly.

Revision _____

_____

Adequate ____ 5. At the end of the activity the learner will distinguish between time intervals.

Revision _____

_____

With the aquarium, I would have these objectives:

SO #2

Code_____

Educational Objectives

Answer Sheet

Do not use this sheet until instructed to do so.

1. YES NO
2. YES NO
3. YES NO
4. A B
5. A B C D
6. A B C D
7. A B
8. A B
9. A B
10. A B
11. A B

SO #3

Code_____

Instructional Objectives

1. The learner will realize the value of organizing observations.
2. The learner will order a group of objects according to size.
3. The learner will appreciate George Gershwin's music.
4. The learner will understand the workings of the pencil sharpener.
5. The learner will construct a classification of objects on the basis of color, shape, texture, and size.
6. The learner will identify and name the internal parts of an electric motor.
7. The learner will demonstrate and describe the difference between mass and weight.
8. The learner will see the necessity for using experimental methods and the precise measurement of physical phenomena.
9. The learner will state the rule for the placement of the letters e and i when they come together in a word.
10. The learner will describe and construct a method for finding Pi.
11. The learner will apply the rule for finding the volume of a rectangular prism.
12. The learner will recognize a point on a graph by extrapolation.
13. The learner will increase his ability in solving math problems.
14. The learner will really understand how a semipermeable membrance functions.

15. The learner will observe that the presence of carbon dioxide in a liquid can be verified.

16. The learner will distinguish inferences from observations.

17. The learner will gain an insight into the metamorphic cycle of butterflies.

SO #4

Code _____

Matching Action Words with Operational Definitions

There are nine action words in Science - A Process Approach: name, identify, order, describe, construct, distinguish, state a rule, apply a rule, and demonstrate. Below are the operational definitions for each of the verbs. For each definition write the name of the a-propriate action word in the blank.

1. _____The individual makes a physical object, a drawing, or a written or verbal statement (such as an inference, hypothesis, or a test of any of these).

2. _____The individual communicates, verbally or in writing, a relationship or principle that could be used to solve a problem or perform a task.

3. _____The individual specifies what an object, event, or relationship is called.

4. _____The individual states observable properties sufficient to identify an object, event, or relationship.

5. _____The individual derives an answer to a problem by using a stated relationship or principle.

6. _____The individual selects a named or described object by pointing to it, touching it, or picking it up.

7. _____The individual performs a sequence of operations necessary to carry out a procedure.

8. _____The individual arranges three or more objects or events in a sequence based on a stated property.

9. _____The individual selects an object or event from two or more which might be confused.

Code _____

Let's use these action words to describe the following:

1. "Choose the circles" would be _____ the circles.
2. "Tell the colors in the painting" would be _____ the colors in the painting.
3. "Show how you could decide" would be _____ how you could decide.
4. "Place the objects from longest to shortest" would be _____ the objects from longest to shortest.
5. "Make a graph" would be _____ a graph.
6. "Tell all the characteristics of an event" would be _____ an event.
7. "Explain how you found the area of a circle" would be _____ for finding the area of a circle.
8. "Find the area of a circle with a diameter of one inch" would be _____for finding the area of a circle with a diameter of one inch.
9. "Which side is port and which is starboard" would be _____ between the port side and the starboard side.

SO #6

Code_____

A. Construct two groupings for these objectives:

At the end of the exercise the learner should be able to:

1. Name 2 or more characteristics (such as color, shape, size, and texture) of a single object.
2. Construct a classification of objects.
3. Identify a specific object.
4. Identify and name temperature ranges using codes on a thermometer.
5. Distinguish between two very different temperatures.
6. Identify a set having only one member.
7. Identify the empty set.
8. Identify a member of a set.
9. Construct a graph.
10. Identify and name a colored object by comparing it with a different kind of object that has the same color.

B. Revise the inadequate objectives to make them more adequate.

SO #7

Code_____

INSTRUCTIONAL ACTIVITY: A & B

A. Ask children to open their boxes of crayons (includes red, green, yellow, blue, orange, purple). Ask children to point to their red crayon when the word red is stated. Repeat this for all six colors.

B. Ask each child to match one crayon with some article of clothing that someone else is wearing. For example: Find a crayon whose color is most like Jane's skirt. If Jane's skirt is pale blue, the child should point to the blue crayon. (Xerox - Observing 1, Part A).

Performance Objective:

A. _____

B. _____

ACTIVITY C: INSTRUCTIONAL ACTIVITY

On a table in front of the class, arrange a collection of common objects which will be sufficiently different in weight so that the children can order them from heaviest to lightest by lifting them. A pail of sand, a brick, a wooden block, a baseball, a Styrofoam ball, and a ping-pong ball are good objects to use. Have one or two children try to arrange them in order from lightest to heaviest, and ask the others if they agree.

Then extend this lifting and ordering activity to include a series of objects which look alike and have the same volume, but which will "feel" different when they are lifted because some were heavier than others. (Xerox - Measuring 5, Part B)

Performance Objective:

C. _____

ACTIVITY D: INSTRUCTIONAL ACTIVITY

Give the children a box of objects that can be classified into two or three categories. Supply them with graph paper marked in 2 centimeter squares, and with crayons that they can use to draw keys and to graph the number of items in each group. Have the children make graphs and show these to the rest of the class. (Xerox - Communicating 2, Part B)

Performance Objective:

D. _____

SO #8

Code_____

Stating Instructional Objectives

Appraisal

Task 1: Place an X before any of the following instructional objectives which are acceptably stated.

1. ____ The student will know the important battles of World War I.

2. ____ The student will prefer cooking to sewing.

3. ____ The student will name the date when women were first permitted to vote.

4. ____ The teacher will describe with understanding five concepts treated in the text.

5. ____ The student will state a rule for all of the story problems presented.

6. ____ The student will accurately learn the best known works of Voltaire.

7. ____ The teacher will help the class to solve algebra problems correctly.

8. ____ The student will appreciate the key importance of algebraic approaches.

9. ____ The student will identify 10 supporting facts in a written persuasive paragraph.

10. ____ The student will become familiar with how to write an essay using no reference but personal experiences.

Adequate ___ 5. At the end of these activities, the student will be able to describe common objects in terms of length estimates using centimeters.

Revision _____

_____

Task 2: Read the instructional activity described below and decide what actions describe expected outcomes. After doing this you are to write out:

The action words used to describe student behavior.
State the expected outcomes as behavioral objectives.

Select two or three objects that contain the various two-dimensional shapes. Have the children identify and name the circles, ellipses, triangles, rectangles, and squares in one object at a time.

Hold up the pyramid in various orientations. Ask: What two-dimensional shapes can be seen in the pyramid? (Triangles, square on the base.) Have them demonstrate the shapes with their fingers.

Now pick up the cone and let the children identify the shapes they see. They will name the circle and some may say they see a triangle. If they have difficulty identifying the triangle, hold the cone next to the chalkboard and trace its edges. When the cone is removed, ask" What shape is drawn on the board? This same procedure may be helpful in identifying the rectangle that may be associated with a cylinder.

Action words used to describe student behavior:

_____

_____

Task 4 State the expected outcomes as performance objectives.

Task 2: Mark each objective as adequate or revise it so as to be adequate.

Adequate ___ 1. After carrying out these activities the child should be able to construct a classification of a set of objects into two or more groups depending on whether the objects can or cannot be used in a stated way.

Revision _____

_____

_____

Adequate ___ 2. At the completion of this lesson the pupil will be able to construct a pyramid.

Revision _____

_____

Adequate ___ 3. After these activities the pupil will be able to construct an operational definition without help from other pupils or the teacher.

Revision _____

_____

_____

Adequate ___ 4. After this lesson the child will be able to identify a fraction while working at his desk.

Revision _____

_____

_____

Duplicated Materials -- With Answers

SO #1

Code_____

Stating Instructional Objectives

Pre-Appraisal

Task 1: Place an X before any of the following instructional objectives which are acceptably stated.

1. ____ The student will grasp the significance of the Treaty of Versailles.

2. ____ The student will have an attitude favorable to English grammar interpreted by his response to a questionnaire.

3. ____ The student will know six verbs.

4. ____ The student will learn the names of the common tools in wood shop.

5. ____ The teacher will list three major causes of the Civil War on the chalkboard.

6. X The student will demonstrate the threading of a sewing machine.

7. ____ The student will pay attention as the teacher demonstrates the use of the lathe.

8. ____ The student will develop a sense of the cultural unity of man.

9. X The student will name and describe the themes of four of Shelley's poems.

10. ____ The child will develop interest in leisure sports.

Read the instructional activity described below:

Show the children some shapes. Ask them to identify those which are symmetrical and those which are nonsymmetrical. Ask several children to demonstrate where the shapes might be folded to show their symmetry.

Ask the children to name those shapes which are symmetrical with respect to more than one line and to demonstrate this symmetry by folding.

Task 2: Write the action words used above to describe student behavior.

IDENTIFY

DEMONSTRATE

NAME

Task 4: State the performance objectives of the instructional activity given above.

THE LEARNER WILL BE ABLE TO IDENTIFY SHAPES WHICH HAVE SYMMETRY.

THE LEARNER WILL DEMONSTRATE THAT OBJECTS MAY BE FOLDED IN ONE OR MORE WAYS TO SHOW SYMMETRY.

Task 3: Mark each objective as adequate or revise it so as to be adequate.

Adequate __X__ 1. At the end of the lesson the learner will name the three principal colors: yellow, red, and blue.

Revision _____

Adequate __X__ 2. After the activity the learner can distinguish between objects which have an odor and those that do not.

Revision _____

Adequate ____ 3. After carrying out this lesson, the learner should be able to identify tastes.

Revision __X__ The learner will identify 3 tastes -- sweet, sour, salty.

Adequate ____ 4. At the end of the exercise the child should be able to order sets very quickly.

Revision __X__ The child will order sets which have from one to twelve members on basis of most members to least members.

Adequate ____ 5. At the end of the activity the learner will distinguish between time intervals.

Revision __X__ The learner will distinguish time intervals by comparing their length to the lunch period.

SO #2

Code_____

Educational Objectives

Answer Sheet

Do not use this sheet until instructed to do so.

1. YES (NO)
2. YES (NO)
3. YES (NO)
4. (A) B
5. (A) B C (D)
6. A (B) (C) D
7. A (B)
8. A (B)
9. (A) B
10. A (B)
11. A (B)

SO #3

Code_____

Instructional Objectives

1. The learner will realize the value of organizing observations.
2. The learner will order a group of objects according to size.
3. The learner will appreciate George Gershwin's music.
4. The learner will understand the workings of the pencil sharpener.
5. The learner will construct a classification of objects on the basis of color, shape, texture, and size.
6. The learner will identify and name the internal parts of an electric motor.
7. The learner will demonstrate and describe the difference between mass and weight.
8. The learner will see the necessity for using experimental methods and the precise measurement of physical phenomena.
9. The learner will state the rule for the placement of the letters e and i when they come together in a word.
10. The learner will describe and construct a method for finding Pi.
11. The learner will apply the rule for finding the volume of a rectangular prism.
12. The learner will recognize a point on a graph by extrapolation.
13. The learner will increase his ability in solving math problems.

14. The learner will really understand how a semipermeable membrane functions.

15. The learner will observe that the presence of carbon dioxide in a liquid can be verified.

16. The learner will distinguish inferences from observations.

17. The learner will gain an insight into the metamorphic cycle of butterflies.

Specific or Vague Behavioral or Non-behavioral	
2, 5, 6, 7, 9, 10, 11, 16	1, 3, 4, 8, 12, 13, 14, 15

SO #4

Code_____

Matching Action Words with Operational Definitions

There are nine action words in Science - A Process Approach: name, identify, order, describe, construct, distinguish, state a rule, apply a rule, and demonstrate. Below are the operational definitions for each of the verbs. For each definition write the name of the appropriate action word in the blank.

1. CONSTRUCT The individual makes a physical object, a drawing, or a written or verbal statement (such as an inference, hypothesis, or a test of any of these).

2. STATE A RULE The individual communicates, verbally or in writing, a relationship or principle that could be used to solve a problem of perform a task.

3. NAME The individual specifies what an object, event, or relationship is called.

4. DESCRIBE The individual states observable properties sufficient to identify an object, event, or relationship.

5. APPLY A RULE The individual derives an answer to a problem by using a stated relationship or principle.

6. IDENTIFY The individual selects a named or described object by pointing to it, touching it, or picking it up.

7. DEMONSTRATE The individual performs a sequence of operations necessary to carry out a procedure.

8. ORDER The individual arranges three or more objects or events in a sequence based on a stated property.

9. DISTINGUISH The individual selects an object or event from two or more which might be confused.

SO #5

Code _____

Let's use these action words to describe the following:

1. "Choose the circles" would be ___IDENTIFY___ the circles.
2. "Tell the colors in the painting" would be ___NAME___ the colors in the painting.
3. "Show how you could decide" would be ___DEMONSTRATE___ how you could decide.
4. "Place the objects from longest to shortest" would be ___ORDER___ the objects from longest to shortest.
5. "Make a graph" would be ___CONSTRUCT___ a graph.
6. "Tell all the characteristics of an event" would be ___DESCRIBE___ an event.
7. "Explain how you found the area of a circle" would be ___STATE A RULE___ for finding the area of a circle.
8. "Find the area of a circle with a diameter of one inch" would be ___APPLY A RULE___ for finding the area of a circle with a diameter of one inch.
9. "Which side is port and which is starboard" would be ___DISTINGUISH___ between the port side and the starboard side.

SO #6

Code_____

Construct two groupings for these objectives, and name the basis of your groupings.

At the end of the exercise the learner should be able to:

1. Name 2 or more characteristics (such as color, shape, size, and texture) of a single object.
2. Construct a classification of objects.
3. Identify a specific object.
4. Identify and name temperature ranges using codes on a thermometer.
5. Distinguish between two very different temperatures.
6. Identify a set having only one member.
7. Identify the empty set.
8. Identify a member of a set.
9. Construct a graph.
10. Identify and name a colored object by comparing it with a different kind of object that has the same color.

Adequately specific context	Inadequate context
1, 4, 6, 7, 9, 10	2, 3, 5, 8

Code_____

INSTRUCTIONAL ACTIVITY: A & B

A. Ask children to open their boxes of crayons (includes red, green, yellow, blue, orange, purple). Ask children to point to their red crayon when the word red is stated. Repeat this for all six colors.

B. Ask each child to match one crayon with some article of clothing that someone else is wearing. For example: Find a crayon whose color is most like Jane's skirt. If Jane's skirt is pale blue, the child should point to the blue crayon. (Xerox - Observing 1, Part A).

Behavioral Objective:

A. The learner will identify the following colors by sight: yellow, orange, red, purple, blue, green.

B. The learner will identify other colors as being like one of the colors, yellow, red, or blue.

ACTIVITY C: INSTRUCTIONAL ACTIVITY

On a table in front of the class, arrange a collection of common objects which will be sufficiently different in weight so that the children can order them from heaviest to lightest by lifting them. A pail of sand, a brick, a wooden block, a baseball, a Styrofoam ball, and a ping-pong ball are good objects to use. Have one or two children try to arrange them in order from lightest to heaviest, and ask the others if they agree.

Then extend this lifting and ordering activity to include a series of objects which look alike and have the same volume, but which will "feel" different when they are lifted because some were heavier than others. (Xerox - Measuring 5, Part B)

Behavioral Objective:

C. The learner will order objects by lifting them.

ACTIVITY D: INSTRUCTIONAL ACTIVITY

Give the children a box of objects that can be classified into two or three categories. Supply them with graph paper marked in 2 centimeter squares, and with crayons that they can use to draw keys and to graph the number of items in each group. Have the children make graphs and show these to the rest of the class. (Xerox - Communicating 2, Part B)

Behavioral Objective:

D. The learner will construct a bar graph.

SO #8

Code _____

Performance criteria for acceptable response:

Task 1 - all correct
Task 2 - 4 of 5
Task 3 - 3 of 3
Task 4 - 2 of 2

Stating Instructional Objectives

Appraisal

Task 1: Place an X before any of the following instructional objectives which are acceptably stated.

1. ____ The student will know the important battles of World War I.

2. ____ The student will prefer cooking to sewing.

3. __X__ The student will name the date when women were first permitted to vote.

4. ____ The teacher will describe with understanding five concepts treated in the text.

5. __X__ The student will state a rule for all of the story problems presented.

6. ____ The student will accurately learn the best know works of Voltaire.

7. ____ The teacher will help the class to solve algebra problems correctly.

8. ____ The student will appreciate the key importance of algebraic approaches.

9. __X__ The student will identify 10 supporting facts in a written persuasive paragraph.

10. ____ The student will become familiar with how to write an essay using no reference but personal experiences.

Task 2: Read the instructional activity described below and decide what actions describe expected outcomes. After doing this you are to:

State the action words used to describe student behavior.
State the expected outcomes as behavioral objectives.

Select two or three objects that contain the various two-dimensional shapes. Have the children identify and name the circles, ellipses, triangles, rectangles, and squares in one object at a time.

Hold up the pyramid in various orientations. Ask: What two-dimensional shapes can be seen in the pyramid? (Triangles, square on the base.) Have them demonstrate the shapes with their fingers.

Now pick up the cone and let the children identify the shapes they see. They will name the circle and some may say they see a triangle. If they have difficulty identifying the triangle, hold the cone next to the chalkboard and trace its edges. When the cone is removed, ask: What shape is drawn on the board? This same procedure may be helpful in identifying the rectangle that may be associated with a cylinder.

Action words used to describe student behavior:

IDENTIFY AND NAME

DEMONSTRATE

IDENTIFY

NAME AND SEE

Task 4: State the expected outcomes as behavioral objectives:

THE LEARNER WILL BE ABLE TO IDENTIFY AND NAME TWO-DIMENSIONAL SHAPES AS PARTS OF OBJECTS.

THE LEARNER WILL BE ABLE TO IDENTIFY AND NAME THE TWO-DIMENSIONAL SHAPE COMPONENTS OF THREE-DIMENSIONAL SHAPES.

Task 3: Mark each objective as adequate or revise it so as to be adequate.

Adequate X 1. After carrying out these activities the child should be able to construct a classification of a set of objects into two or more groups depending on whether the objects can or cannot be used in a stated way.

Revision _____

Adequate ____ 2. At the completion of this lesson the pupil will be able to construct a pyramid.

Revision X At the completion of this lesson the pupil will be able to construct a clay pyramid with a triangular shaped base.

Adequate ____ 3. After these activities the pupil will be able to construct an operational definition without help from other pupils or the teacher.

Revision X After these activities each pupil will be able to construct an operational definition of mass.

Adequate ____ 4. After this lesson the child will be able to identify a fraction while working at his desk.

Revision X After this lesson, given a group of whole numbers, mixed numbers, and fractions, the child will be able to identify the fractions.

Adequate X 5. At the end of these activities, the student will be able to describe common objects in terms of length estimates using centimeters.

Revision _____