The first page of this list of requirements for elementary science teachers lists overall course objectives for a Teacher Corps science education course. Next are instructions for learning to use the Science Teacher Observation Rating Form, followed by an analysis of each item on the form, instructions for scoring it, and a copy of the form itself. The next part contains objectives for the student to complete in order to become familiar with three new science programs. This part also contains the forms to complete in order to examine each program. The final part concerns teaching techniques. It lists requirements that must be met and contains several forms for the student to complete. (RC)
The student will:

1. demonstrate knowledge of science content by taking a standardized general science test and obtaining a score at or above the 75th percentile for the end of the year's ninth grade students. (See Science Content Module for Elementary Teachers.)

2. learn to use the Science Teacher Observation Rating Form (STORF) and demonstrate competence observing two of the pre-recorded STORF tapes. He will then use the STORF with two video tapes of his own teaching and write a short paragraph for each, analyzing his teaching behavior.

3. learn about new programs in elementary school science (SAPA, ESS, SCIS) by using introductory material, and examining and performing the activities for six units. This must include all three programs.

4. develop plans and materials, and use the following techniques in teaching science to children:
   a. Science Center Component
   b. Counterintuitive (Discrepant Events)
   c. Pictorial Riddles
   d. Open-ended Investigation
   e. Inductive Teaching

   To demonstrate competence in each of the above techniques, the student will provide a video tape of his teaching, using the plans and materials he developed, for each of the techniques. (Five tapes in all.)

5. plan and teach a science unit (several lessons) to children. The following must be provided for:
   a. Active involvement of children
   b. Differing achievement and ability levels of children
   c. General student planning
   d. Student choices
   e. Student planned inquiry
   f. Use of manipulative materials

6. teach a unit (several lessons) of one of the new programs (SAPA, ESS, SCIS) to children. Activity #3 is a prerequisite.

7. demonstrate competence in the "Progresses of Science" by obtaining a score of 80% or above on the post test for The Processes of Science: A Modular Approach.
LEARNING TO USE THE SCIENCE TEACHER OBSERVATION RATING FORM (STORF)

The student will learn to use the Science Teacher Observation Rating Form (STORF) and demonstrate competence observing two of the pre-recorded STORF tapes. He will then use the STORF with two video tapes of his own teaching and write a short paragraph for each, analyzing his teaching behavior.

To complete this activity the student must:

1. Read and understand the direction booklet for the STORF. (Ask questions if there is anything that is not clear to you.)

2. Use the STORF with any two of the following tapes.
   A. STORF Training Tape = Kindergarten Situation
   B. STORF Training Tape = First Grade Situation
   C. STORF Training Tape = Third Grade Situation
   D. STORF Training Tape = Fifth and Sixth Grade Situation
   
   THESE TAPES MAY BE VIEWED IN THE MICRO TEACHING LAB, 219 NORMAN HALL.

3. Record himself (on video tape) teaching science at two different times. Each session should be about 20 minutes in length.

4. Use the STORF to observe both of these tapes.

5. Hand in the following items as evidence of the completion of this learning activity.

   A. Two copies of the STORF used to observe the STORF Training Tapes, with the following information on the back of each (upper right hand corner).
      1. Your name
      2. Date observed
      3. STORF TAPE number
      4. Grade level observed
      5. Score

   B. Two copies of the STORF used to observe your science teaching situations with the following information on the back of each (upper right hand corner).
      1. Your name
      2. Date recorded
      3. Date observed
      4. Tape identification (title and part of tape)
      5. Grade level and school
      6. Score

   C. Two short paragraphs analyzing your science teaching situations. (One paragraph for each). Be sure to use the results of the STORF in these analyses.
Directions for
SCIENCE TEACHER OBSERVATION RATING FORM #
(STORF)

# Developed in the College of Education at the University of Florida by Lynn Oberlin

This form was developed as an instrument to help observe teachers working with children in the area of science. Value judgements are not made as to good and bad practices but practices are looked at as being different. On the left hand side of the instrument is Behavior A and on the right hand side is Behavior B. Behavior A is experimental and Behavior B is traditional. No teacher fits entirely within Behavior A or entirely within Behavior B. The general behavior pattern is determined by the number of items checked under Behavior A compared with the number of items checked under Behavior B.

This instrument is used in teacher education to help people who are going to be teachers look at different kinds of teacher behavior. In looking at different kinds of teacher behavior, the future teacher may begin to identify with a certain kind. He may find the kind of person he would like to be. At this stage, he can see in one column the things he would do much of the time and in the other column the things he would do much less frequently.

ROOM OBSERVATION

The room observation is made when the room is first entered. Some of the items are starred. A starred item is one that must be marked and it must be marked in only one column. For example, item Number 1, Behavior A, says "the room has a science corner or table." Under Behavior B it says "the room has no science corner or table." One
or the other has to be true. Put a check in the total column in either Behavior A or Behavior B. One column must be marked but not both.

<table>
<thead>
<tr>
<th>BEHAVIOR A</th>
<th>BEHAVIOR B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>Item 2</td>
</tr>
<tr>
<td>*1. Room has a science corner or table.</td>
<td>*1. Room has no science corner or table.</td>
</tr>
</tbody>
</table>

What is being asked is whether there is a place in the room where science things and materials are kept; and where children can work on science. It might be a corner or table; or it might be a shelf, counter, or other location.

*2. Student made or brought in material is in evidence. *2. There is little or no student made or brought in material.

This item refers to all kinds of materials. They do not have to be related to science. These materials must be evident from just looking around the room. If 0, 1, or 2 items are seen, it is interpreted as "little or no material" and recorded as Behavior B. If 3 or more items are seen it is recorded as Behavior A.

Item 3


The third item is not starred. It may be checked in either column, both columns, or not checked at all. Original art work means things that children have drawn or created themselves. Pattern art work includes traced material, cut out patterns, and pictures all ready drawn which
students color. Art work does not have to be related to science.

The entire ROOM OBSERVATION section is omitted when the teacher being observed is in someone else’s room over which she has no control.

TEACHER-STUDENT OBSERVATION

Items 4 through 21 are timed. After the room observation is completed, observe what happens in the room for five minutes. At the end of five minutes stop observing and spend two minutes recording what has been seen in column 1, items 4 through 21. Observe for another five minutes. After which, stop observing for two minutes and record the observations in column 2. Observe for another five minutes and then record these observations in column 3.

The starred items on Teacher-Student Observation are numbers 4, 5, 6, 7, and 8. Each of those items must be checked for each observation in either Behavior A or Behavior B; one or the other but not both. Items which are not starred may be checked in either column, both columns, or not checked at all.

**Item 4**

*4. Teacher brings other subject matter into lesson (math, soc. studies, lang. arts, etc.)

Behavior A must be demonstrated by content matter from some area such as mathematics, social science, or language arts being included as a part of the lesson. It must be there for instructional purposes and not just used for punishment or class control. Behavior B is an absence of Behavior A.
Item 5

*5. Students can work at their own pace. *5. All students proceed at same rate.

If the majority of students can work at their own pace it is Behavior A, if not, it is Behavior B.

Item 6


Behavior A means that students are sharing experiences with each other and not just answering teacher initiated questions. The opportunity must exist for a majority of the class to participate, although it is not necessary for them to do so during the observation period. Anything less than what is mentioned above is considered Behavior B.

Item 7

*7. Students are active participants. *7. Students listen only.

This item refers to the majority of the class.

Item 8

*8. Students have a chance to follow their own interests. *8. Students have no chance to follow their own interests.

Score this item as to whether the majority of the class has a chance to follow their own interests.

Items 9 - 21

These items are not starred. For each observation period, both Behavior A and Behavior B may be checked, either may be checked, or neither may be checked. If any evidence of a described behavior is observed, it should be checked.
Item 9

9. Teacher engages in student activities.

If the teacher engages in a student activity, Behavior A is checked. Behavior B is checked when there is a student activity in which the teacher does not become involved.

Item 10

10. Teacher has individuals doing different work.

If the teacher has several individuals doing different work, Behavior A is checked. When most students are working on the same assignment Behavior B is checked. Both behaviors may be checked during the same five minute period.

Item 11

11. Teacher asks open questions.

Open questions refer to questions which do not have just one correct answer. These are also called divergent type questions. Closed questions are questions which have just one correct answer. These are also called convergent type questions.

Item 12

12. Teacher asks questions not directly answerable from textbook.

This item has to be answered from evidence which is seen during the five minute observation period. If the teacher asks a question and the student reads a statement directly from the textbook in answer to that
question, obviously this is Behavior B. Behavior B also includes questions answered by facts which appear to have been learned by textbook reading. If the type of question the teacher asks cannot be answered with just textbook knowledge, it is Behavior A.

Item 13

13. Teacher questions misconceptions.

13. Teacher permits formation of misconceptions.

This cannot be observed unless some misconception comes about and is identified by the observer. Then, if the teacher questions the misconception in any way this is Behavior A. When the teacher permits the misconception to stand and lets the youngsters believe the information to be true, this is Behavior B.

Item 14

14. Teacher encourages guessing or hypothesizing.

14. Teacher expects students to know and NOT guess.

When the teacher encourages the student to try to answer a question by guessing or by trying to figure out the answer, this is Behavior A. Behavior B is exhibited when the teacher expects only the right answer to the question to be given and expects the student not to give an answer unless he is sure that it is correct.

Item 15

15. Teacher refrains from judging student's behavior or work.

15. Teacher passes judgment on student's behavior or work.

Judging a student's behavior or work refers to a teacher telling a student that his work is good, poor, he is a very good student, he is
misbehaving, or has been very bad that day. A statement similar to these is evidence that a teacher is passing judgment on a student's work or behavior.

Item 16

16. Students read material from different sources. 16: Students are assigned to read from same book.

If students are seen to be reading from different sources during the five minute observation time, this is Behavior A. If any time during the five minute time students are assigned to read the same materials this is Behavior B. For Behavior B it is not necessary for the entire class to be assigned to read the same material but only for a majority of the students to be assigned the same material.

Item 17

17. Students' questions answered by other students. 17. Students' questions answered by teacher.

This is a matter of looking at each question asked, by a student, to see who is answering it. Both Behavior A and Behavior B are often exhibited within the same five minute period.

Item 18

18. Students conduct experiments individually or in groups. 18. Teacher or student demonstrations for entire class to watch.

When students take an active part in an experiment, either individually or as a part of a group, it is Behavior A. If students are watching a teacher or another student do a demonstration, it is Behavior B.
Item 19

19. Students design their own experiments.

Behavior A is evidenced by the students designing their own experiments. Behavior B means that students perform experiments furnished to them in a textbook or some other source.

Item 20

20. Students' questions shape the direction the lesson takes.

What seems to determine the direction in which the lesson proceeds?

If Behavior A is evident, student's questions have some effect on the direction that the lesson takes. As Behavior B is evident, student questions have no effect on the direction that the lesson takes and it continues onward in a predetermined direction. Both Behavior A and Behavior B may be evidenced within the same five minute period.

Item 21

21. Teacher's non-verbal cues provide positive reinforcement for students.

Non-verbal cues include everything except the spoken word. A smile, a pat on the back, a pleasing gesture, a frown, or a clenched fist are examples of non-verbal cues.
SCORING THE STORF

The Science Teacher Observation Rating Form (STORF) is scored in the following way. Behaviors observed in the three observations are totaled in the right hand column for Behavior A and in the left hand column for Behavior B. As "Room Observation" takes place only once, each check scores as one. All 21 items are totaled and the amount recorded in the appropriate place at the bottom of the page. The score is obtained by adding 100 to the Behavior A column and then subtracting the Behavior B column from it.

Score = 100 + A - B

Scores above 100 tend to indicate experimental type behavior (A) and scores below 100 tend to indicate tradition type behavior (B).
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</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>2. Student brought in material is in evidence.</td>
<td>1</td>
</tr>
<tr>
<td>3. Original art work of pupils displayed.</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BEHAVIOR B</th>
<th>TEACHER-STUDENT OBSERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Teacher brings other subject matter into lesson.</td>
<td>1</td>
</tr>
<tr>
<td>5. Students can work at their own pace.</td>
<td>1</td>
</tr>
<tr>
<td>6. Students share their experiences.</td>
<td>1</td>
</tr>
<tr>
<td>7. Students are active participants.</td>
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</tr>
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<td>1</td>
</tr>
<tr>
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<td>1</td>
</tr>
</tbody>
</table>

**TOTAL - 21 items**
3. WORKING WITH THE NEW SCIENCE PROGRAMS.

The student will learn about the new programs in elementary school science (SAPA, ESS, SCIS) by using introductory material, and examining and performing the activities for six units. This must include all three programs.

**NOTE:** The terms "AAAS" or "SAPA" are used interchangeably.

The student will become familiar with three (SAPA, SCIS, ESS) of some thirty new, experimental elementary science programs. Each program has a unique philosophy as the "best" approach to having children learn science. It should be hoped that no one program would be satisfactory to the teacher for use as it stands, but that it would serve as a guide for constructive, productive, enjoyable science teaching and learning. Reflect on the strengths and weaknesses of each activity (program) and how you might improve it.

The following approach may be used to properly complete the assignment:

1. Report to the microteaching lab, room 219, and view the videotaped presentation on each of the programs.

2. Upon completing #1, you are in a position to work with the program materials. All manuals and MOST ESS and SCIS materials are located in offices 173-175. SAPA manuals are in those offices but ALL materials are in the laboratory room, 174 Norman. The "A" materials (Kindergarten or first grade) are located at the northwest end of the room; "B" materials (first or second grade) are located at the extreme southwest end in the cabinet; and "E" materials (fourth or fifth grade) at the northwest end by the door.

Work does not have to be done in our science lab if you have the program materials available from another source. Some of these may be available at the school in which you are working.

Additional directions to the programs are found in the respective manuals.

3. A unit for our purpose of study will be:

   A. The activities in a SINGLE SAPA manual (many manuals in each "A", "B", "E" box).
   
   B. The activities in a single packaged unit for ESS and SCIS.
   **NOTE:** Some SCIS and ESS units are very long. On these, it is recommended that you spend no more than 40 minutes per activity.

   C. For the ESS material, "Attribute Games and Problems," any two activities will count as a unit. All four activities may be written up as two units.
4. On completion of EACH activity fill out a report form and when ALL six reports are completed, turn them in stapled in the upper left hand corner. Included with this should be a statement that you have completed #1 above. Report forms are included in this packet. Extra forms may be obtained from the instructor or lab assistant.
EDE 560 TEACHER CORPS

Examination of New Programs

Name ___________________________ Date __________________

Program: SAPA ESS SCIS (Circle one)

Unit ____________________________
(Complete - Name, Number, Level, etc.)

Activities Performed at ____________________________ School or Norman Science
(name)

Laboratory or ____________________________ (Fill it in and circle)

Activities Performed ____________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

Critique of Unit ____________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________
4. TEACHING TECHNIQUES

The student will develop plans and materials, and use the following techniques in teaching science to children:

a. Science Center Component
b. Counterintuitive (Discrepant Events)
c. Pictorial Riddles
d. Open-ended investigation
e. Inductive Teaching

1. Read the sections in the books as listed below. These books will be on reserve in the Education Library. Another copy will be available at Teacher Corps headquarters in Building K.

Counterintuitive p. 130-t32
Pictorial Riddles p. 132-134

Counterintuitive p. 5-11.

Counterintuitive p. 131-140
Pictorial Riddles p. 140-143

2. View the video tape "Science Teaching Techniques for Elementary School Teachers." It is available at the Micro Teaching Laboratory, 219 Norman Hall.

NOTE: This video tape is still in production. If you need to complete this activity before it is ready, you may use the following as an alternative to item 2 above.

Listen to the tape "Teaching Techniques." It is available at the Media Center, 229 Norman Hall. There is also a copy that you may listen to during scheduled open labs in 174 Norman Hall. Another copy will be left at Teacher Corps headquarters in Building K.

3. Forms that you must fill out are in this packet. Extra forms may be obtained from the instructor.

4. If at any point it is not clear what you are to do, ASK THE INSTRUCTOR FOR HELP. This may be done during a scheduled open lab or in the instructor's office.
5. Plan activities for the teaching techniques. Before putting much time on this, check with the teacher you are working with to see if you may try the teaching techniques in her room. Find out what her plans are so that your material will fit into the teacher's overall goals.

6. Turn in your forms for the five teaching techniques you have completed and the form which lists the five video tapes. These should be clipped or stapled together in the upper left hand corner. Be sure that your team leader has signed the teaching technique forms.
EDE 560 | TEACHER CORPS
Science Teaching Techniques

Identification of Video Tapes
Mark all tapes with your name, my name (Oberlin) and a title.

<table>
<thead>
<tr>
<th>Teaching Techniques</th>
<th>Tape Title</th>
<th>Location of Materials on the tape</th>
</tr>
</thead>
</table>

List 5 techniques here with spaces between.
EDE 560 TEACHER CORPS
Science Center Component

Name ________________________________

Title of science center component ________________________________

Description ________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

What is learned by using this component? ____________________________

________________________________________________________________

________________________________________________________________

School ________________________________ Grade (s) ____________

Number of students ____________

Teacher Corps student's evaluation of the use of the science center component with children ________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

Are other teaching techniques used in this lesson? _______ If so, what? _______

________________________________________________________________

________________________________________________________________

This science center component was used in the above named school on _______

(date) 

Signature - Teacher Corps Student __________________ Signature - Team Leader __________________

The team leader may list comments on the other side of this sheet.
Counterintuitive (Discrepant Events)

Name ________________________________

Discrepant event ________________________________

________________________________________________________________________________

How was it used in helping children learn science? _________________________________________

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________________________________________________________________ geometric ly, it is a two-dimensional shape with two equal sides and a total of three sides. The rules of this pattern are that the number of sides a shape has is equal to the number of sides an object has. For example, a triangle has three sides, and a rectangle has four sides. This geometric pattern is based on the idea that the number of sides a shape has is directly proportional to the number of sides an object has.
EDE 560 TEACHER CORPS
Pictorial Riddles

Name ____________________________________________

Description of pictorial riddle (s) (attach if possible) ___________________________

________________________________________________________________________

What science did the pictorial riddle (s) help children to learn? ________________

________________________________________________________________________

How was (were) the pictorial riddle (s) used with children? __________________________

________________________________________________________________________

School ___________________________ Grade (s) ___________________________

Number of students ___________________________

Teacher Corps Student's evaluation of the use of the pictorial riddle (s) with children

________________________________________________________________________

________________________________________________________________________

Are other teaching techniques used in this lesson? ______ If so, what? ______

________________________________________________________________________

The pictorial riddle (s) was (were) used with children in the above named school on
(date) ___________________________

Signature - Teacher Corps Student ___________________________ Signature - Team Leader

The team leader may list comments on the other side of this sheet.
EDE 560 TEACHER CORPS
Open-ended Investigations

Name ____________________________________________

Description of the open-ended investigation ____________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

How is it open-ended? ________________________________________________________________

____________________________________________________________________________________

What science does it help children learn? ________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

How was the open-ended investigation used with children? _________________________________

____________________________________________________________________________________

____________________________________________________________________________________

School __________________________ Grade(s) ____________ No. of students ______

Teacher Corps Student's evaluation of the use of the open-ended investigation with children ________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Are other teaching techniques used in this lesson? _____ If so, what? _________________

____________________________________________________________________________________

This open-ended investigation was used with children in the above named school on ________

(date) ____________________________________________

Signature - Teacher Corps Student

Signature - Team Leader

The team leader may list comments on the other side of this sheet.
EDE 560 TEACHER CORPS
Inductive Teaching

Name

Description of Inductive teaching sequence

What are the specifics?

What generalizations do children discover?

School  Grade(s)  No. of students

Teacher Corps Student's evaluation of the inductive teaching lesson with children

Are other teaching techniques used in this lesson?  If so, what?

This inductive teaching was done in the above named school on ________ (date).

Signature - Teacher Corps Student  Signature - Team Leader

The team leader may list comments on the other side of this sheet.
5. PLANNING AND TEACHING A SCIENCE UNIT

The student will plan and teach a science UNIT (several lessons) to children. The following must be provided for:

a. Active involvement of children
b. Differing achievement and ability levels of children
c. General student planning
d. Student choices
e. Student planned inquiry
f. Use of manipulative materials

Name ________________________________

Title of Unit ________________________________

Description of Unit

How does the unit provide for:

Active involvement of children? ________________________________

Differing achievement and ability levels of children? ________________________________

General student planning? ________________________________

Student choices? ________________________________
(TEACHER CORPS SCIENCE EDUCATION - Planning and Teaching a Science Unit)

Student planned inquiry?

______________________________________________________________

______________________________________________________________

Use of manipulative materials?

______________________________________________________________

______________________________________________________________

School ________________________________________ Grade(s) ______________

Number of students __________

Teacher Corps Student's evaluation of the use of this unit with children?

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

This unit was taught by the Teacher Corps student to children at the above named school on the following dates: ________________________________

______________________________________________________________

______________________________________________________________

Signature - Teacher Corps Student ____________________________ Signature - Team Leader ____________________________

The team leader may list comments below or on the other side of this sheet.
6. TEACHING FROM NEW PROGRAMS

The student will teach a UNIT (several lessons) of one of the new programs (SAPA, ESS, SCIS) to children. Activity #3 is a prerequisite.

Name ____________________________

Unit ________________________________
(Complete--Name, Number, Level, etc.)

Activities ________________________________

_____________________________________

School ____________________________ Grade(s) ______ No. of Students __

Teacher Corps Student's evaluation of the activities used with children ________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

The above activities were used by the Teacher Corps student with children on the following dates: ________________

Signature – Teacher Corps Student __________________________ Signature – Team Leader __________________________

The team leader may list comments on the other side of this sheet.