EDUC 511
Teaching the Lesson

Feb 8

Agenda

- Items for the Good of the Order
  - Lesson Objectives
- Teaching the lesson
  - Presentation Format
- Age appropriate/conceptual development
  - Management
  - Questioning skills

Things to keep in mind

- Write the focus question on the board
- Wait time & number of questions
- Be careful of your questions
  - "Does anyone know …?"
  - "Who can tell me …?"
  - "How do you think…?"

Lesson info

- Watch 'their' questions
  - "What do you think will happen…"
    - To- make a prediction
  - "Why is…" to Give me one reason
  - "Why did" to What caused

What do I look for?

- Introduction
  - Problem
  - Procedure
- Lesson Body
  - Students on task?
- Post Lab
- In General
  - Questions
  - 'Good' Science

Lesson presentation format

- Set the scene
  - Title of the lesson
  - Grade level
  - Where the lesson fits in the curriculum—what have they studied previously

Remember

- Just a brief intro…
- Teach us NOT TELL US ABOUT the lesson.

Inquiry Lesson Presentation

LUCK OF THE DRAW

OBJECTIVES

Review

- Lesson Objectives
  - 3 Parts
    - What the student is to learn (specific)
      - 'students will learn about simple machines'
    - How they will learn
      - A lab activity?
      - A demonstration of a simple machine?
    - How do you know they have learned
      - Completion of a worksheet
      - Built and demonstrated a model
      - Oral report of findings

Objectives

- To appreciate…
- To help…
- To see…
- To Think…

- Ask yourself –how can this be measured?

Sample

- Students will demonstrate their understanding of the instructor's *lesson objective format* by writing an example in their notebook.

CONCEPTUAL DEVELOPMENT

What is age appropriate?

Scientific Reasoning Skills	Grade					
	1	2	3	4	5	6
Observing, Measuring, and Identifying Properties	*	*	*	*	*	*
Seeking Evidence Recognizing Patterns and Cycles		*	*	*	*	*
Identifying Causes and Effect Extending the Senses				*	*	*
Designing and Conducting Controlled Experiments						*

Processes

1 OBSERVING	•observe objects or events in a variety of ways using one or more of the senses. •identify properties of an object, i.e., shape, color, size, and texture. •use indirect methods, i.e., hand lenses, microscopes, thermometers, to observe objects or events. •observe objects or events by counting, comparing, estimating, and measuring.
2 CLASSIFYING	•identify properties useful for classifying objects. •group objects by their properties or similarities and differences. •construct and use classification systems.
3 INFERRING	•suggest explanations for events based on observations. •distinguish between an observation and an inference.
4 PREDICTING	•forecast a future event based on prior experience, i.e., observations, inferences, or experiments.

Processes

5 MEASURING	•compare and order objects by length, area, weight, volume, etc. •measure properties of objects or events by using standardized units of measure. •measure volume, mass, weight, temperature, area, length, and time, using appropriate units and appropriate measuring instruments.
6 COMMUNICATING	•construct and use written reports, drawings, diagrams, graphs, or charts to transmit information learned from science experiences. •verbally, ask questions about, discuss, explain, or report observations. •after an investigation, report the question tested, the experimental design used, results, and conclusions drawn, using tables and graphs
7 USING SPACE/TIME RELATIONS	•describe an object's position, i.e., above, below, beside, etc., in relation to other objects. •describe the motion, direction, spatial arrangement, symmetry, and shape of an object compared to another object.
8 DEFINING OPERATIONALLY	•state definitions of objects or events in terms of what the object is doing or what is occurring in the event. •state definitions of objects or events based on observable characteristics.

Processes

9 FORMULATING HYPOTHESES	•identify questions or statements which can and cannot be tested. •design statements, i.e., questions, inferences, predictions, which can be tested by an experiment.
10 EXPERIMENTING	•design an investigation to test a hypothesis. •conduct simple experiments. •recognize limitations of methods and tools used in experiments, i.e., experimental error •utilize safe procedures while conducting investigations.
11 RECOGNIZING VARIABLES	•identify the manipulated (independent) variable, responding (dependent) variable, and variables-held-constant in an experiment. •control the variables in an investigation.
12 INTERPRETING DATA	•organize and state in his/her own words information derived from a science investigation. •revise interpretations of data based on new information or revised data.
13 FORMULATING MODELS	•create a mental, physical, or verbal representation of an idea, object, or event. •use models to describe and explain interrelationships of ideas, objects, or events.

Skills

Below is a list of skills for consideration;

1. abstracting key concepts from the science content in text and references
2. analyzing (observations, ideas, findings, results, reading, reports etc.)
3. applying previously learned knowledge to explain new situations.
4. classifying (observations, ideas, findings, results, objects, living things, etc.)
5. communicating (speaking and writing clearly, concisely, accurately, etc.)
6. conducting experiments.
7. constructing and/or interpreting charts, tables, histograms, graphs, etc.
8. deduction (reasoning from [a]known principles to an unknown principle, [b] the general to the specific, [c]a premise to a logical conclusion.)
9. describing (observations, ideas, findings, results, properties, characteristics, etc.)
10. distinguishing between pertinent and irrelevant observations, findings, results, information, etc.
11. formulating and understanding operational definitions.
12. formulating clear and intelligent questions.
13. formulating hypotheses.
14. formulating mental models.
15. induction (reasoning from particular facts or individual cases to a general principle or conclusion.
16. inference. (arriving at a decision by reasoning from known facts or evidence.)

Skills

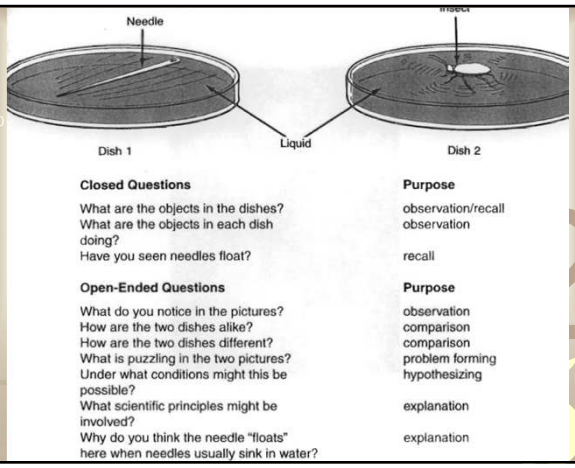
17. interpreting (observations, ideas, findings, results reading etc.)
18. keeping records.
19. making comparisons.
20. manipulating science equipment.
21. measuring.
22. noting similarities and differences.
23. observing.
24. organizing effective oral and written reports.
25. organizing and formulating plans to solve problems.
26. participating in group discussion.
27. planning or designing experiments.
28. predicting.
29. reasoning
30. recognizing and using number relations.
31. recognizing and using space/time relations.
32. using controls when experimenting.
33. using numbers of experiments to obtain valid results.
34. using table of contents, index, and glossary of science texts and references.
35. working together in small or large groups.

Associate these With your Assignments

Conceptual Development

- Science Outcomes
- Conceptual Development

QUESTIONING TECHNIQUE



Closed Questions	Purpose
What are the objects in the dishes?	observation/recall
What are the objects in each dish doing?	observation
Have you seen needles float?	recall

Open-Ended Questions	Purpose
What do you notice in the pictures?	observation
How are the two dishes alike?	comparison
How are the two dishes different?	comparison
What is puzzling in the two pictures?	problem forming
Under what conditions might this be possible?	hypothesizing
What scientific principles might be involved?	explanation
Why do you think the needle "floats" here when needles usually sink in water?	explanation

Things to keep in mind

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- Wait time & number of questions
- Be careful of your questions
  - "Does anyone know …?"
  - "Who can tell me …?"
  - "How do you think…?"

Requirements for opening questions

- Must have the students cooperation
- May require a fair amount of experience on the children's part
  - Used to yes/no or one word answers
- Reinforcement to help elicit student responses
  - Avoid negative or rejecting
  - Try accepting student response and asking for expansion

Wait time

- Mary Budd Rowe
  - Average time in waiting for a response before asking the next or re-phrasing is
  - Increased wait time has shown the following:
    - Length of response increases
    - Decrease in a failure to respond
    - S initiated responses increase
    - T-S interaction decreases while S-S increases
    - Number of S questions increases

Common Errors

- Questioning
  - Format
    - Why?
    - How do you feel…,
    - What about..
    - Can anyone tell me …
    - Who can …
    - Does anyone know…
    - What do you think about…

- Precision of the question
  - What is a light bulb?
  - Or
  - What are the parts of a light bulb?
  - What does the bulb do?
  - Or
  - What is the role of the light bulb in the circuit?
- Pacing
- Too fast
- Too many
- Change the question midstream

ACTIVITY ORGANIZATION

Giving Directions

- Managerial & Instructional
  - Engage the attention
  - Establish eye contact
  - Speak slowly
  - Be specific
  - Small increments
- Think before you speak

Management Hints

- Prepare the ‘children’ to work in the laboratory
  - State your expectations
  - May organize into groups and individual roles
  - Clarify difficult procedures/demo the construction of the equipment
  - Review safety!!!!

Next Time Activities

- More on Questioning
- Roles in the laboratory
- Challenge Activity