

IES Professional Development Program - Suggested Workshop Schedules

- One-Hour Presentation Using IES Soil
- One-Day Workshop Using IES Soil

One-Hour Presentation Using IES Soil

- One-Hour Power Point Presentation (795 KB)

Materials

For the instructor:

- Overhead transparency sheets and overhead projector
- Soil sample in zip-lock bag

For each group of participants:

- Soil samples in zip lock bags (Investigations 1 and 2)
- Drinking straws, knives or tongue depressors (for probing soil)
- Water source
- Plastic cups, clear (2 or more)
- Hand lenses (2 or more)
- Newspaper or paper towels to cover the work area/li>

Procedure

Have the IES logo transparency on the overhead projector as participants arrive. See Presentation above.

1. Pre-assessment

- Show a soil sample and ask participants to share their thoughts

Questions you might ask include, "What does soil feel like," "What is soil made of," "Is soil the same all over the Earth? Explain."

- Instruct participants to write answers to the pre-assessment questions

Pre-assessment questions are included in the Resources section of this manual. These same questions appear on the "Reflecting" page at the end of the student book, under the subheading "Back to the Beginning". Tell participants that the purpose of the Pre-assessment is to provide a baseline assessment of student knowledge. This can be compared with later answers, as a measure of student progress.

- Hold a review session, recording participant responses

Build two lists, one for "ideas we have about soil," and one for "questions we have about soil". List participants' ideas as they give them, without alteration. Record these ideas on an overhead transparency, flip chart, chalkboard, or dry-erase board.

- Distribute handouts (from the back of this manual):

- Student Ratings and Self-Evaluation

- Earth System Connection Sheet

- Checkpoint Form

Introduce Investigating Earth Systems. See Presentation above.

2. Investigation 1

Discuss the flow of a typical IES module. Additionally, you will want to discuss assessment in IES and the scope of the project (the different modules). See Presentation above.

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One-Day Workshop Using IES Soil

- One-Day Power Point Presentation (795 KB)

Materials

For the instructor:

- Overhead transparency sheets and overhead projector
- Soil sample in zip-lock bag
- For each group of participants:
- Soil samples in zip lock bags (Investigations 1 and 2)
- Additional soil samples (Investigation 3)
- Access to location for taking core samples of soil (Investigation 4)
- Map of sampling area where core samples will be taken
- Water source
- Plastic cups, clear (2 or more)
- Hand lenses (2 or more)
- Newspaper or paper towels to cover the work area
- Plastic strainer (spaghetti colanders work well)
- Kitchen sieve
- Spoon
- Hand lens
- 3 large mixing bowls
- 4 squares of white poster board
- Access to a sink or water supply
- Wooden block
- Hammer
- 1" Heavy Duty PVC pipe (the piece should be about 10" in length)
- Wooden dowel piece that is longer than the PVC, but that fits inside it
- Drinking straws, knives, or tongue depressors (for probing soil)
- pH soil test kit

For each participant:

- Copy or photocopy of module (Note: these cannot be given to participants to take home without written permission of It's About Time Publishing)

Procedure

Project IES logo as participants arrive. See Presentation above.

1. Pre-assessment

- Introduce the Key Question, "What can you investigate about soil?"
Solicit participant responses, recording them on an overhead transparency. Solicit new questions that participants have about soil. Tell participants that, although this repeats some of the pre-assessment, in a classroom this activity would serve as both a review of the pre-assessment and an introduction to the upcoming investigation.
- Distribute soil samples
Participants will record observations using all their senses. Ask participants how they intend to record their results. As you circulate, inquire as to what kinds of data they are collecting (visual, tactile, etc.) and how they are recording it. Of course, the intent here is to model teacher behavior, not interrogate the participants! Suggest methods of recording observations, such as a table with columns for each of the senses.
- Re-visit soil questions and select one for further investigation
Instruct groups to discuss their observations and revisit their earlier questions. Instruct them to choose a question for further investigation. Remind them that it must be a question they can answer given the constraints of time, space and materials.
- Conduct the investigation
Circulate, observe, and interact with the participants. Ask questions about their inquiry processes, i.e. What is their question? What do they predict? How will they test their prediction?
- Discuss findings
Ask participants to share the question they investigated, their results, and any new question they want to investigate.
- Briefly discuss Investigations 2-7

Introduce Investigating Earth Systems. See Presentation above.

2. Investigation 1

- You will need to collect soil samples in advance of the workshop. Keep them in sealed plastic bags to retain soil moisture (water is part of soil!). Remember to focus on inquiry processes, especially question-forming and observing. As an introduction to the module, participants will examine soil using their senses.

Discuss the structure of an IES Investigation, the Student Journal, and the Key Question. See Presentation above.

3. Investigation 2

- Soil samples used in the first investigation can be used here - just make sure that the samples are "reassembled". You may have to bring a large container of water if you are not holding the workshop in a science classroom. The goals of the activity include not only separating soil by passing it through air and water, but also predicting and using evidence.

4. Investigation 3

For this investigation, each group will need the following materials:

- Newspaper or paper towels to cover the work area
- Plastic strainer (spaghetti colanders work well)
- Kitchen sieve
- Spoon
- Hand lens
- 3 large mixing bowls
- 4 squares of white posterboard
- Access to a sink or water supply
- Soil sample

Break for Lunch

5. Investigation 4

- For this investigation, each group will need the following materials:

Note: If you think it will be difficult or too time-consuming to collect samples during the workshop, collect the soil cores ahead of time, bag each core sample, and transport them to the workshop. Bring one section of PVC pipe and the wooden dowel to show how you collected and extruded the samples. Bring the map to show where you collected the samples.

Discuss inquiry in IES. See Presentation above.

6. Investigation 5, part 4

- For this investigation, each group will need the following materials:

Discuss the Earth System Connections Sheet (they should have received a copy of this already). Also, discuss using the final investigation as assessment. See Presentation above.

Questions?

- Show a soil sample and ask participants to share their thoughts.

Questions you might ask include, "What does soil feel like," "What is soil made of," "Is soil the same all over the Earth? Explain."

- Instruct participants to write answers to the pre-assessment questions.

The questions are included in the Resources section of this manual. These same questions appear on the "Reflecting" page at the end of the student book, under the subheading "Back to the Beginning". Tell participants that the purpose of the Pre-assessment is to provide a baseline assessment of student knowledge. This can be compared with later answers, as a measure of student progress.

- Hold a review session, recording participant responses.

Build two lists, one for "ideas we have about soil," and one for "questions we have about soil". List participants' ideas as they give them, without alteration. Record these ideas on an overhead transparency, flip chart, chalkboard, or dry-erase board.

- Distribute the following handouts (from the back of this manual):

- Student Ratings and Self-Evaluation
- Earth System Connection Sheet
- How to Make Maps
- Checkpoint Form

Additionally, you will need to distribute a copy of Investigating Soil. (Note: these cannot be given to participants to take home without written permission of It's About Time Publishing)

- Introduce the Key Question, "What can you investigate about soil?"

Solicit participant responses, recording them on an overhead transparency. Solicit new questions. Tell participants that, although this repeats some of the Pre-assessment, in a classroom this activity would serve as both a review of the pre-assessment and an introduction to the upcoming investigation.

- Distribute soil samples.

Participants will record observations using all their senses. Ask participants how they intend to record their results. As you circulate, inquire as to what kinds of data they are collecting (visual, tactile, etc.) and how they are recording it. Of course, the intent here is to model teacher behavior, not interrogate the participants! Suggest methods of recording observations, such as a table with columns for each of the senses.

- Re-visit soil questions and select one for further investigation.

Instruct groups to discuss their observations and revisit their earlier questions. Instruct them to choose a question for further investigation. Remind them that it must be a question they can answer given the constraints of time, space and materials.

- Conduct the investigation.
Circulate, observe, and interact with the participants. Ask questions about their inquiry processes, i.e. What is their question? What do they predict? How will they test their prediction?
- Discuss findings.
Ask participants to share the question they investigated, their results, and any new question they want to investigate.
- Introduce the Key Question, "How can soil be separated?"
This time, encourage active participation by choosing a member of the group to lead the discussion of the Key Question. Instruct the volunteer to copy participants' responses without altering them. Circulate among the participants, encouraging participation from less vocal members of the group.
- Introduce steps 1-2.
Discuss the steps by reading through them with the participants. Ask for questions. If there are no questions, ask the group to tell you:
 - *What to do if there are lumps in the soil*
 - *What they should observe*
 - *What they should record**This mirrors what teachers might do in the classroom to check for their students' understanding. Explain why you check for understanding before moving to the investigation (i.e. it allows you to identify misconceptions, avoiding confusion and frustration).*
- Circulate and observe as participants separate soil by passing it through air.
- Discuss participants' predictions about how soil will move through water
Record participants' ideas on an overhead transparency.
- Circulate and observe as participants investigate.
- Discuss predicted and observed outcomes of the experiment.
Explain the next phase of the experiment, which will not be done. Students would be asked to predict the outcome if soil and water mixtures were allowed to sit out overnight. Students would then label their soil samples and place them in a secure location for later observation.
- Instruct participants to complete the handout "Student Ratings and Self-Evaluation".
Select numbers to represent the highest and lowest rating. These numbers go in the "Key" at the top of the page. Collect handouts. Inform participants that this is one of many assessment tools in the teacher's edition of each IES module.
- Begin with the Key Question, "How can soil be separated?"
Invite a volunteer to summarize participants' responses on an overhead transparency.
- Discuss the procedure for investigation 3.
Invite 2 participant volunteers to come to the front for a demonstration. Have prepared the supplies needed for one group to perform the experiment. Place them on a table at the front. Stand at the back of the room. Instruct one of the seated participants to read the instructions for step 1. Volunteers then perform the step. Choose participants to read steps 2-6. The volunteers perform the steps, in abbreviated fashion.
- Discuss problems that participants might have with the procedure.

- Instruct participants to begin the investigation.
- Circulate and observe participants.
- Read the Digging Deeper article for this investigation "Materials Found in Soil".
Read it aloud or distribute copies and read as a group. Explain that there is a reading at the end of each investigation. Explain the reason for this (i.e., the focus is on the investigation, which gives context and deeper meaning to the content in the readings). Explain also that there are background readings for teachers in the teacher's edition. These readings go into much more depth than student readings.
- Instruct participants to complete the Checkpoint forms during the break.
- Discuss responses to Checkpoint forms. Ask for additional feedback from the participants.
- Collect soil core samples, or distribute pre-collected samples.
- Distribute maps of the local sampling area (for instructions on how to make a map of the local area, see the Resources section at the back of this manual).
Record sampling areas on the map.
- Analyze soil core samples
Emphasize observing and collecting data as you circulate among the participants.
- Discuss each group's results
Record their data in the form of a chart. Project these data on the overhead projector.
- Instruct participants to make soil maps of the local area, using the class's data.
- When the maps have been completed, discuss what additional data could be included in the map.
- Discuss Investigation 5, parts 1-3.
For this investigation you will need the following materials for each participant:
 - Soil sample
 - Soil Testing Kit (pH only)
- Distribute soil test kits.
Discuss directions for measuring pH.
- Instruct participants to complete steps 2-3.
- Instruct participants to add this information to their soil maps.
- Explain that, in a classroom setting, students would test for nitrogen, phosphorous and potassium as well.
- Discuss Investigations 6 and 7.
Materials:
 - 1" Heavy Duty PVC pipe (about 10" long)
 - Wooden dowel (longer than the PVC pipe, but thin enough to fit snugly inside it)
 - Access to a site where core soil samples can be taken
 - Map of sampling area (see the appendix for instructions on how to make a map of any site in the U.S.)
