Session 8: Designing a Lesson

Overview

In this session, participants focus on applying some of the insights and understandings they've gained in the course so far to the development of a lesson with a partner. Participants are guided in the development of their designed lesson using a *COS Lesson Design Starter*, in an environment of support from their peers and instructors. This activity and design template helps them understand the complexity of designing lessons to address a science concept effectively. They are guided to incorporate the pedagogy presented in previous sessions, including the learning cycle and effective teaching approaches, while designing their lesson to help learners come to some level of understanding of a science concept.

Background Information for the Presenter

Developing classroom lessons and curriculum is challenging and requires different skills than teaching. The goal of this session is not to create curriculum developers or even great lessons, but to engage participants in considering the important elements that effective lessons embody and to start them on this process. Few participants, even if they become educators, will engage in full-scale materials development during their careers, but all who interact with the public, or become educators of some sort (faculty, science educator, teacher) will need to plan lessons and activities, and to adapt and modify experiences according to feedback about the learners' level of understanding.

In designing the *Communicating Ocean Sciences to K-12 Audiences* course as a whole we have tried to "practice what we preach." The course seeks to exemplify a flexible model of how people learn. In that sense, this session's main emphasis can be seen as the *application* phase in the course, as participants apply what they've learned about learning and teaching to the design of a lesson. They will have additional opportunities to revisit, revise, and add to their lesson as the course proceeds and additional teaching strategies and pedagogies are presented.

We have included a chart of "Key Characteristics of Exemplary Lessons" garnered from numerous educators in diverse learning environments. The key characteristics can be organized into (1) characteristics of the lesson design and (2) characteristics of the facilitation of the lessons. Although it may be quite difficult to separate the two categories, in general the characteristics of lesson design may include some or all of the following:

- incorporates the learning cycle;
- focuses explicitly on the nature and processes of science and on learning goals and concepts;

- offers opportunities to meaningfully engage with ideas and to manipulate objects;
- allows for inquiry, including exploration, investigation, making explanations based on evidence, and applying new learnings;
- provides opportunities for learners and educator to assess the level of learners' understanding;
- inclusive of all learners; and
- presents science content accurately.

Characteristics of exemplary facilitation of lessons include some or all of the following:

- encourages and provides opportunities for discussion of ideas and engagement in classroom experiences with peers;
- encourages learners to make meaning individually, with peers, and with someone more knowledgeable;
- uses diverse teaching approaches;
- makes connections to current/prior knowledge;
- educator uses effective discussion-leading strategies such as the discussion map to encourage diverse ideas and promote meaningful discussions;
- accommodates needs and interests of diverse learners; and
- presents science content accurately.

Session Objectives

In this session, participants:

- participate in exemplary lessons and work as a class to create an ongoing list of key characteristics of exemplary lessons
- apply what they've learned in the course so far to the task of developing a lesson to address a specific ocean science concept
- have the opportunity to brainstorm, discuss ideas, and start developing a lesson with their partner

Session Activities at a Glance

Quick Write (10 minutes)
Participants reflect on a question pertaining to their assigned reading.

Debrief Classroom Experiences (optional; 10 minutes)
Participants share highlights and challenges from their classroom placements.

Introducing Designing a Lesson Session and Think-Pair-Share of Key Characteristics of Exemplary Lessons (15 minutes)
Participants are introduced to designing a lesson and participate in a Think Pair Share about their ideas about what makes an exemplary lesson. Participants' ideas regarding the following prompts are recorded on chart paper.

- What are some key characteristics of classroom lessons that you feel would make them exemplary?
- What are some key characteristics of the facilitator's implementation that would lend them to being considered exemplary?

This chart will be revisited after engaging in this session's exemplary lesson and again in each of the following sessions as additional learning theory and pedagogy about teaching and learning are introduced.

Engaging in Exemplary Lesson & Debrief (45 minutes)
Participants have a chance to participate in an exemplary classroom lesson modified from the *Ocean Sciences Sequence for Grades 3–5*, published by Carolina Curriculum, 2011. At the completion of the lesson they participate in a brainstorm to add to the ongoing list of "Key Characteristics of Exemplary Lessons." Participants then reflect on how various components from the list could be incorporated into the design of their own lesson.

Overview of Lesson Design Starter and Initial Design of Lesson (40 minutes)
Pairs use the *COS Lesson Design Starter* to start to develop their own lesson and specifically focus on five "Questions to Consider."

Peer Review of Lesson Plans (10 minutes)
Participants give each other advice about their lesson ideas as they look for the presence or absence of components listed on the "Key Characteristics of Exemplary Lessons" chart.

Deep Sea Science Content Presentation (optional; 20 minutes)
This presentation focuses on the deep-sea ecosystem and organism adaptations for this environment. (See index of Science Presentations on the web site if you are interested in obtaining this PowerPoint.)

Planning For Presenting Lessons in the Classroom (15 minutes)
Participants have the opportunity to further plan and refine their lesson with their partner in order to implement it during one of the last sessions of their classroom field placement.

Homework (5 minutes)
(Note – this homework is assigned as part of the UC Berkeley course; other institutions may decide to use these assignments or develop different assignments.)

Time Frame

Total Workshop: 2 hours 50 minutes

Quick Write (10 minutes)
Debrief classroom experiences (optional; 10 minutes)

Introducing Designing a Lesson Session and Think Pair Share about Key Characteristics of Exemplary Lessons (15 minutes)
Engaging in an Exemplary Lesson and Debrief (45 minutes)
Overview *COS Lesson Design Starter* & Initial Design of Lesson (40 minutes)
Peer Review of Lesson Plans (10 minutes)
Deep Sea science content presentation (optional; 20 minutes)
Planning for Presenting Lesson in the Classroom (15 minutes)
Homework (5 minutes)

Materials Needed

For the class:

- digital projector
- PowerPoint slides for Session 8
- Materials for presenting exemplary lesson
  - 16 Adaptation Organism sheets
  - optional: 16 plastic model organisms (matching the Adaptation Organism sheets)
  - Sentence strips (optional)
  - Transparency of Student worksheet: Movement Adaptations
  - Powerpoint slides of Ocean habitat images: coral reef habitat, soft bottom habitat, rocky seashore habitat and open ocean habitat
- Chart paper and pens

For each participant:

- *COS Lesson Design Starter*
- Student worksheet: *Movement Adaptations*

Preparation of Materials

1. Make one copy for each participant of the following pages:
   — *COS Lesson Design Starter* and student worksheet: *Movement Adaptations*.

2. For the Exemplary lesson:
   - **Prepare transparency**. Make a transparency of the student worksheet: *Movement Adaptations* so that you can model how to complete it.
   - **Write out key concepts.** Write out the following key concepts for this activity in large, bold letters on sentence strips or chart paper and underline the words *organisms, adaptations,* and *habitat*:
     — Different ocean organisms have different adaptations for moving through the ocean.
     — An organism's adaptations are related to the habitat in which the organism lives.
   - **Decide if you will use the plastic organism models.** They are optional, and the photographs of organisms included with this session are sufficient

to do the lesson. If you do decide to include the models, there are many places to obtain them from the web. (Key words to use include: plastic ocean animals; in a tube.)

- **Arrange Adaptation Organism Sheets and plastic models around the room.** Place each of the 16 Adaptation Organism Sheets together with its associated plastic model around the room. Space these materials so students can move easily from one organism to another with as little crowding as possible. You may decide to use different organisms than those included in this session. If so, pick a diversity of organisms with interesting adaptations. Note: You'll need to have the plastic model of the Great White Shark at the front of the class at the beginning of the session.

3. Write out the following prompts for the Engaging in a Lesson portion of the session:
   - What is the goal of the lesson and/or concepts addressed?
   - What did the facilitator do to engage you in the lesson?
   - What opportunities did the facilitator provide to help you make sense of the science concepts?
   - What particular aspects of the lesson made it effective?

4. Create a chart titled "Key Characteristics of Exemplary Lessons" with two columns: "Key Characteristics of Lessons" and "Key Characteristics of Facilitator's Implementation" to record results of the Think Pair Share about exemplary lessons.

5. Decide if you will do the following activity.

Science Presentation: Deep Sea

This presentation is focused on the deep-sea ecosystem and adaptations for this environment. We chose to use this presentation because several pairs of participants were interested in designing activities about the deep sea. (See index of Science Presentations on the web site if you are interested in using the PowerPoints for this presentation.) Feel free to substitute a different science content presentation based on your and your participants' interests.

Note: If you choose to not do this presentation, you'll have more time for the participants to discuss the reading assigned for homework, engage in the exemplary lesson, or work on designing their own lesson.

Instructor's Guide–Session Details

Quick Write

1. **Participants do Quick Write.** Display the Quick Write prompt regarding the reading. Give participants about 5 minutes to respond.

2. Share highlights of quick write. After about 5 minutes, have participants share their reflections with a partner. Then have the partners share the highlights with the entire class.

Sharing Classroom Experiences

1. Participants share classroom experiences. Ask for volunteers to share some of their experiences including highlights and challenges they are encountering in their classroom placement. Use the discussion map below to help facilitate the discussion using the following prompts.

a. Describe an interaction with a student that you feel went well. What did you do and what was your evidence that it went well?
b. What is something that you feel did not go well and what makes you think that?
c. What questions or concerns do you have that you would like some feedback from the course participants about?

Suggested Discussion Map:

- Listen to their responses.
- Ask for evidence, explanation, or clarification.
- Ask for agreements, disagreements, and alternative opinions & views.
- Synthesize their ideas as you reference their comments.
  - Listen to how they describe their experiences and characteristics of the learning and teaching that occurred.
  - Restate/summarize for the participants the kinds of experiences and suggestions offered by the group.

Introducing Designing a Lesson Session

1. Set context for session. Let participants know that today partners will have the chance to work together to start designing their own lesson. They'll use a lesson template to help organize their ideas, have the opportunity to share ideas with their peers and the instructors, and receive feedback on their initial lesson design.

2. Introduction to key characteristics of exemplary lessons. Share with participants that an important part of this session will be the opportunity to engage in an exemplary lesson. These experiences will then be used to determine what are the ***key characteristics*** of (a) the **lesson** and (b) the **facilitator's implementation** that makes

them exemplary. Participants will be given the opportunity to incorporate these key characteristics into the design of their own lesson.

3. Think-Pair-Share about key characteristics. Use the following prompts and have participants do a Think-Pair-Share about the key characteristics they think would be present in an exemplary classroom lesson.

- What are some key characteristics of lessons that you feel would make them exemplary?
- What are some key characteristics of the facilitator's implementation that would lend them to being considered exemplary?

4. Record ideas from group debrief. Record participant's ideas on chart paper in two columns: "Key Characteristics of Lessons" and "Key Characteristics of Facilitator's Implementation." Say that we'll return to this chart later in the session and possibly add more characteristics after engaging in the exemplary lesson. We'll also revisit this chart in each session as additional learning theory and pedagogy about teaching and learning are introduced.

[Some likely characteristics participants may suggest based on learning strategies and pedagogy presented so far include: the learning cycle, opportunities to engage in different kinds of teaching approaches, the nature and processes of science, incorporating inquiry, importance of using the discussion map and thoughtful use of questions, accessing and connecting to learners' prior knowledge and providing opportunities for learners to construct their own knowledge. Participants are also likely to mention the importance of focusing on ocean sciences concepts.]

Note: A more extensive list of possible ideas for making a list of "Key Characteristics of Exemplary Lessons" is included in this write-up based on educational strategies and pedagogy presented in the entire course. At this point your participants are not likely to mention everything listed here since all of these ideas have not yet been addressed or presented. We suggest that you do not show this complete list to your participants yet, but instead make time in subsequent sessions to have participants add to their initial brainstorm, as new ideas arise and as they do activities. This list is mainly for you to have all of the key characteristics listed in one place. You may decide at some point to distribute this list to your participants as an overview of what they've learned in the course related to exemplary lessons.

Engaging in an Exemplary Lesson: *Adaptation for Movement*

Introducing Exemplary Lesson

1. Introduce exemplary lesson. Tell participants that they will have the opportunity to engage in a lesson designed for a class of students (grades 3-6). They are to engage in the lesson as if they were a classroom student and pay

particular attention to what makes the lesson and the facilitator's implementation effective or not.

2. Participants engage in lesson and take notes. As the participants engage in the lesson, encourage them to jot down notes about the key characteristics they notice that makes the lesson exemplary. Post the following prompts for them to keep in mind as they engage in the lesson:

- What is the goal of the lesson and/or concepts addressed?
- What did the facilitator do to engage you in the lesson?
- What opportunities did the facilitator provide to help you make sense of the science concepts?
- What particular aspects of the lesson made it effective?

Introducing Adaptations

1. Introduce the word *adaptation.* Write the word "adaptation" on the board. Ask students to turn to the person next to them and have a brief discussion about what that word means to them. After a couple of minutes, call on a few volunteers to share what their partner said. Depending on what the students say, share with them that adaptation means a body part or behavior that helps an organism survive.

2. Provide examples of body parts that may be adaptations. Say, "For example, the shell of a clam may be an adaptation. The shell protects the clam from animals that could eat it. If the shell helps the clam survive, then the shell may be an adaptation." Hold up the plastic model of the Great White Shark and ask, "What's one body part this shark has that could help it survive?" Take a few responses. If no one mentions it, point out the shark's teeth. Tell students that the shark's sharp teeth might help it catch the animals it needs to eat in order to survive. If the shark's sharp teeth help it to survive, then the teeth may be an adaptation.

3. Provide examples of behaviors that may be adaptations. Say, "What an organism DOES can also be an adaptation. For example, clams dig down into the sand or mud, which protects them from other animals that might eat them. If digging down into the sand or mud helps the clam survive, then that behavior may be an adaptation." Hold up the plastic model of the shark and ask students if they can think of something the shark might DO that could help it survive. Call on a few volunteers to share their ideas. [Swim fast, bite the animal it eats.]

4. Lead discussion about *movement* and survival. Tell students that now the class will focus on adaptations related to how animals move. Ask, "How could moving help an animal survive?" Have students discuss the idea with a partner and then after one minute, with their table group. Call on a few volunteers to share their discussions. [Possible answers: It moves toward the food it eats, it moves away from predators, it moves with the seasons to stay at the right temperature.] Make sure that the ideas about moving toward food and away from predators are mentioned.

Researching Organisms' Adaptations Lesson (18 minutes)

1. **Introduce researching organisms' adaptations lesson.** Explain to students that they will observe photographs and plastic models of a few ocean organisms placed around the room. For each organism, they will work with a partner and record possible adaptations related to how the organism moves.

2. **Distribute student worksheet: *Movement Adaptations* and display transparency.** Introduce the worksheet and tell students they will record their ideas on this worksheet as they engage in the activity.

3. **Demonstrate with shark example.** Tell students that the class will first discuss the great white shark as an example of how to complete the worksheet.

a. Name of organism. Point out the first sentence starter on the projected Movement Adaptations worksheet. On the transparency, write "Great White Shark" above the first blank line.
b. Point out the second blank space, "*body shape or body parts*"**.** Hold up the plastic shark and ask students to describe the shark's body shape. [Long body, pointy in the front with wide fins.] Summarize students' ideas in the second blank space on the transparency.
c. How it might move. Ask, **"Based on what we know about the shark's body shape, how might it move?"** [Swim.] Elicit more details be asking, **"Do you think that with this body shape, the shark swims fast or slow?"** [Fast.] Write "swim fast" in the blank space above " *how it moves*".
d. How the adaptation helps the organism survive. Ask students to now complete the first sentence on the transparency, by suggesting something the shark can do as a result of what they have suggested for *how it moves* (the adaptation). Summarize students' ideas in the fourth blank space "*do something that helps it survive*".
e. Possible adaptations. Point out that you don't have enough evidence to be SURE that sharks move this way. That is why it says *Possible Adaptations* on the worksheet. Ask how you could be more sure. [Observe a video of a shark, observe real sharks.] Emphasize that the word *possible* is important because it's very difficult, even for scientists, to be completely certain about what is and what is not an adaptation. It takes a lot of evidence to be sure about what helps an organism survive.
f. Prompt students to think about habitats. Point out that the possible adaptations the class has recorded for the Great White Shark also have to do with the different habitats in which the organism lives. The great white shark lives in the open ocean where there is lots of room to swim very fast. As students investigate the adaptations of more organisms, they should also think about habitats. Since the ocean has so many diverse habitats, there are many adaptations that are only found in the ocean. (Note: Place the plastic Great White Shark next to its Adaptation Organism Sheet.)

4. **Give instructions**. Point out the Adaptation Organism Sheets and the plastic models arranged around the room. Students will work with a partner to research a few of the organisms and fill in their Student Worksheet: *Movement Adaptations* as the class did for the shark. When a pair of students finishes writing about an organism, they can move to any other organism around the room, as long as there are not too many other students already at that spot.

5. **Students research adaptations.** To begin, assign each pair of students to an organism. Make sure students take their worksheet and pencils with them. Circulate and assist as needed. Remind students to move to another organism after they finish with one. Tell them they will have about 8 minutes to visit the organisms sheets placed around the room.

6. **Provide instructions for sharing ideas**. After about 8 minutes, have students return to their seats. Tell students that partners will split up into separate small groups to share some of their ideas with others. Each group member will tell about one organism he/she investigated, explaining the organism's body shape, how it might move, and a possible adaptation. Let students know that they need to listen carefully to each other's ideas. After a student presents, other students in the group who also investigated the same organism can tell whether they came up with similar or different ideas and what evidence they used. Remind students to ask questions like, "What is your evidence?" "What makes you think that?" when a student presents different ideas from their own.

7**. Students share ideas in small groups.** Ask students to raise their hand if they visited [name one of the displayed organisms] and completed the sentence starter on their worksheet about that organism. Select four students (splitting up partners) and ask that they stand together by the plastic model of that organism. Explain that they will now work together as a small group. Continue until all the students are part of a small group, with at least one organism in common. Have group members begin taking turns sharing, starting with the organism they stood next to when forming their group). Circulate as they share and encourage active listening. Also encourage students to respond to one another's ideas.

8. **Display key concept.** After about 8 minutes of sharing, regain the class's attention. Hold up the first key concept and have a volunteer read it aloud. Point out the important words underlined.

KEY CONCEPT
Different ocean organisms have different adaptations for moving through the ocean.

Discussing Adaptations and Habitats (15 minutes)

1. **Introduce connection between movement and habitats.** Show images of the different ocean habitats and instruct the students to think about what makes these habitats different from each other. Call on a few students to share what they know about different ocean habitats, and what makes them different. Then say, "**The adaptations an animal has for moving has to do with the habitat in which the animal lives. Some ways of moving that work in one habitat wouldn't work in another habitat.**"

2. **Introduce group discussion about skate and its habitat.** Tell students that they will discuss the connection between adaptations for movement and habitat for two animals. On the board, write "Could the skate live in a coral reef habitat?" "What is your evidence?" Show the image of a coral reef habitat and hold up the plastic model of the skate.

3. **Whole group discusses skate.** Tell the students that the skate lives in the soft bottom habitat. Show the image of a soft bottom habitat.

- **a.** How might the organism move? Ask students if they have any questions they would like to ask about the skate. Call on a volunteer to share their questions and/or ideas about how the skate moves. If no one suggests it, tell students that the skate moves by gliding along near the bottom of the ocean and burying itself under mud or sand.
- **b.** Connection to habitat. Ask, **"What does the fact that the skate glides along and buries itself under mud or sand have to do with the fact that it lives in the soft bottom habitat?"** Encourage students to look at the soft bottom habitat image. The call on a volunteer or two to share ideas. [The skate needs soft material, such as sand or mud, to bury itself under. The fairly flat bottom allows the skate to glide along without going up and down much.]
- **c.** Could the skate live in a coral reef habitat? Show the image that shows both the soft bottom habitat and the coral reef habitat. Encourage students to look at the images, then, call on a volunteer or two to share ideas. [It probably couldn't live in the coral reef habitat because the bottom of the coral reef habitat is rocky or covered in hard, sharp coral, and the skate could not bury itself there. It could live in the sandy areas surrounding the coral, and then come to the coral reef to feed.] As needed, help students draw upon their evidence about how the skate might move.

4. **Introduce crab and its habitat.** Tell students that they will now work in a small group to discuss a different organism. Hold up the plastic model of the crab, or the image of the crab and tell students that it lives in the rocky seashore habitat. Show the image of the rocky seashore habitat and the open ocean surface habitat. On the board,

write the next questions: **Could the crab live in the open ocean: surface habitat? What is your evidence?**

5. **Small groups discuss crab adaptations and habitat.** Remind students that all group members need to get a chance to talk, that they should be sure to share their evidence, and that they should listen carefully to each other. Have groups begin discussing. Circulate as they discuss.

6. **Whole group discussion about adaptations and habitat.** Encourage small groups to share what they discussed. Remind them to share their evidence that led them to decide whether the crab could live in the open ocean or not.

Writing Key Concepts

1. **Students write key concept.** Tell the students that they will get to write the next key concept to show what they learned in this activity. Point out the first key concept about adaptations and read it aloud again. Challenge them to work in their small group to write their own key concept about adaptations and habitats. Distribute marking pens and chart paper or sentence strips. Circulate around the room and encourage them to think about the connections between adaptations and habitats. Give them a few minutes to discuss and then write down their group's ideas.

2. **Sharing key concepts.** Call on a few groups to share their key concepts with the whole group. Encourage a discussion about similarities and differences between the small group's ideas. Depending on time, have the whole group refine the key concepts so that they capture all of their ideas in just a few key concepts. Display their key concepts around the room. Optional: Hold up the following key concept and say that this is what you were thinking the key concept was. Point out the important words you underlined and the similarities and differences from what the students wrote.

KEY CONCEPT
An organism's adaptations are related to the habitat in which the organism lives.

3. Revisiting ideas about adaptations. Ask students to think back to what they said about adaptations at the beginning of this lesson. Have them complete the following sentence by filling in the blanks:

I used to think adaptations meant_____, but now I know it means _____.

Debriefing Lesson Design and Facilitation (10 minutes)

1. Whole group debrief of lesson observations. At the conclusion of the lesson, encourage participants to share their ideas about what made the lesson and facilitation effective. Have them give evidence for their observations and highlight strategies that they thought were particularly effective (or not effective). Use the discussion map below to help facilitate the discussion based on the previously provided prompts:

a. What is the goal of the lesson and/or concepts addressed?
b. What did the facilitator do to engage you in the lesson?
c. What opportunities did the facilitator provide to help you make sense of the science concepts?
d. What particular aspects of the lesson made it effective?

Suggested Discussion Map:

- Listen to their responses.
- Ask for evidence, explanation, or clarification.
- Ask for agreements, disagreements, and alternative opinions & views.
- Synthesize their ideas as you reference their comments.

  • Listen to how they describe their experiences and characteristics of the learning and teaching that occurred.

  • Restate/summarize for the participants the key characteristics offered by the group.

2. **Revisiting key characteristics.** Share with the participants that we will revisit and add to the list of key characteristics as the course progresses, and they will also add these additional lesson or facilitation strategies to the design of their lesson in the weeks ahead.

Designing A Lesson

1. Introduce designing a lesson. Tell participants that they will work with their partner to start designing their own lesson. This activity will provide them time to discuss their lesson with their partner and to receive peer and instructor feedback on their lesson design.

2. Project slide, *"Questions to Consider."* Point out that these five questions are what they should ask themselves as they think about designing a lesson. Display the five questions and then ask them to think about how these questions might also be distributed into different parts of the learning cycle.

(1) What do you want your students to learn and experience? (i.e., your goals and concepts)
(2) How will you engage the learners in your lesson?
(3) How will you find out what the learners already know?
(4) What kinds of things will the learners actually do while engaging in the lesson?
(5) What will you do as a facilitator to help them come to an understanding of the concept?

3. Project slide, *"COS Lesson Design Starter."* Distribute the *Lesson Design Starter* sheet and tell them that this form will help them design and record their lesson ideas. Point out that the same five "Questions to Consider" from above are included on the form.

4. Discuss components of the *"Lesson Design Starter."* Discuss each of the components participants will complete, and answer any questions that arise. They are not expected to finish their lesson design today—this is an opportunity to brainstorm, become familiar with portions of the COS lesson write-up, and further refine their own lesson.

5. **Circulate.** Circulate around the room, answering questions, listening, and giving advice if asked as partners work together to complete the *"Lesson Design Starter."*

Peer Review of Lesson Plans

1. Participants share lesson plans with another pair. Tell participants that they will now have the opportunity to share their lesson plans with another pair. Have participants take turns listening and then giving each other advice about their plans. Remind them to keep the Key Characteristics in mind and to note which ones they each have incorporated into their lesson.

2. Partners review own lesson again. Have each set of partners review their own lesson again using the input given by their peers. Encourage frank assessment of their lesson plan, including pros and cons. Have each pair focus on how they might change and improve their activity to include more of the Key Characteristics.

3. Circulate. Circulate around the room, answering questions, listening and giving advice where necessary.

4. **Debrief the experience**. Lead a discussion with the large group, asking the following questions:

- What was difficult about this?
- What caused you to think the hardest?
- What did you need more information about?
- Are there any areas of confusion or concern?
- Was this helpful? In what ways?

5. Completing Lesson Idea Proposals. Tell participants they'll use their work in class today as the basis for the homework assignment—to complete the *Lesson Design Starter*.

Science Presentation: Deep Sea

This presentation focuses on the deep-sea ecosystem and organism adaptations for this environment. We chose to use this presentation because several pairs of participants were interested in designing activities about the deep sea. (See index of Science

Presentations on the web site if you are interested in obtaining the PowerPoint for this presentation.)

Note: If you choose not to do these presentations, you will have more time for the students to either discuss the reading assigned for homework, engage in the exemplary lesson, or work on designing their own lesson.

Planning For Presenting Your Own Lesson in the Classroom

1. Planning for the presentation of own lesson. Tell participants that they will now have the chance to further plan and refine their own designed lesson with their partner. Tell them that they will turn in the *Lesson Design Starter* for homework and receive feedback from the instructors. They will then complete a full Lesson Plan that they will implement during one of the last sessions of their classroom field placement. (Optional: show participants the full *Lesson Plan* attached that they will be given during the following session.)

2. Circulate around the room. Circulate around the room, giving advice where requested and answering any questions.

3. Assign homework.

Online discussion

- Were you able to incorporate some of the key characteristics of exemplary facilitation of lessons into your classroom this week? Please explain.

Reading

Assign reading to be completed by next session.

Lesson Development

Lesson Design Starter to be completed and turned in next week. Instructors will provide feedback and participants will be assigned the final *Lesson Plan*.

COS Lesson Design Starter

(1) What are the goals and science concepts you want your learners to experience and understand?

a. ***Concepts:*** What are some of the concepts you are interested in helping learners understand? (Write out each concept in a complete sentence, rather than listing them as topics – e.g. There is only one ocean that circulates around all the continents.)

b. ***(Learning) Goals:*** What are your goals for this Lesson? (These might include things like "Opportunity to interact with animals," "Investigate using hands-on inquiry," "Promote a deeper appreciation for _____ ")

(2) How will you engage the learners in the lesson?

(3) How will you find out and connect with what the learners already know?

(4) What will the students actually do while engaging in the lesson? (Briefly describe the general flow and how you will incorporate elements of the learning cycle: invitation, exploration, concept invention or introduction, application and reflection.)

(5) What will you do as a facilitator to help the learners come to an understanding of the concept?

Key Characteristics of Exemplary Lessons

1. **Learner Driven**
__ Encourages questions from learners
__ Is sensitive to the learners' prior ideas and knowledge about this topic
__ Evokes "metacognition" (thinking about one's own knowledge/ideas) and reflection
__ Gives learners a sense of authority/ownership of their own learning
__ Has relevance to learners' lives or can show explicit connections to their lives

2. Focus on Goals and Concepts
__Has a specific purpose and focuses on important ideas, concepts or objectives

3. Based on Educational Theory
__ Uncovers/makes connections with learners' current/prior understanding of the content
__ Encourages and provides opportunities for discussion/discourse and other social interactions between peers as they engage in learning activities
__ Includes opportunities for learners to engage in various teaching approaches including some or all of the following: free exploration, guided and open inquiry and problem solving
--Includes visual, verbal and/or physical interactions
__ Includes opportunities for learners to make meaning individually, with peers and with someone more knowledgeable (e.g. facilitator/knowledgeable peer)
--Uses hands-on activities or other experiences to elicit conversations that support learning
__Includes opportunities that explicitly address nature and processes of science
__Allow opportunities for learners to engage in inquiry including exploration and investigation, but also in making explanations and application
__Includes opportunities to engage with and manipulate objects, experiences and conversations in a social setting

4. Accurate
__Presents the science content accurately

5. Engaging
__ Is "minds-on" (not just hands-on), interactive, and engaging
__Learners ***do*** something

6. Inclusive
__ Is "developmentally appropriate," meaning the vocabulary and activities are appropriate for the knowledge level and physical abilities of the learner
__Considers cultural and social aspects of interactions

7. Assessment/Reflection opportunities

__ Learners have opportunities to reflect on what they have learned
__Educators have the opportunity to understand what the learners are taking away from the experience so that they can help the learner to reach a deeper understanding of the content

Lesson Plan

1. Fully develop your lesson design starter into a lesson plan with your partner. Turn in one assignment with both your names on it.
2. Target length is 3-4 pages (typed, dbl-spaced, 12 pt font, 1 inch margins)
3. Due _____
4. 100 points possible
5. Include the following in your lesson plan:
    - Grade level, habitat of study and how your original lesson connects with the other activities you have done in the classroom *(5 points)*
    - Concept and Goal(s)–what is the big idea or key concept and what are some learning goals you have for the students? *(5 points)*
    - Materials you will need – delineate what materials you will collect or purchase from what you need our help to obtain *(5 points)*
    - Describe the activity in detail so that we can understand what you will have the students ***do***. *(40 points)*
    - Describe how you will incorporate elements of the learning cycle. (Invitation, exploration, concept invention or introduction, application and reflection) *(20 points)*
    - What are some questions you plan to ask the students to check for prior knowledge, engage them in the activity, encourage discussion and to find out what they have learned? *(15 points)*
    - What strategies will you use to encourage all students to participate and be actively involved? *(5 points)*
    - What management strategies do you plan to use to organize materials for distribution to the students? *(2 points)*
    - What management strategies will you use to get the students attention during the activity? *(3 points)*

Name ______________________________ Date ____________________

Movement Adaptations (continued)

Possible adaptations
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)
The ___________'s ________________ might help it ____________ , (organism / body shape or body parts / how it moves) so it can ______________________ . (do something that helps it survive)