

Session 4: Designing an Activity

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 an activity with a partner. Participants are guided in the development of their designed activity using a *COSIA Activity Design Starter*, in an environment of support from their peers and instructors. This activity and design template helps them understand the complexity of designing activities to effectively address a science concept. They are guided to incorporate the pedagogy presented in previous sessions, including the learning cycle and effective teaching approaches, while designing their activity, to help learners come to some level of understanding of a science concept.

Background Information for the Presenter

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

In designing the *Communicating Ocean Sciences to Informal 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 an activity. They will have multiple opportunities to revisit, revise, and add to their activity as the course proceeds and additional teaching strategies and pedagogies are presented.

One experience, no matter how compelling, memorable, or surprising (as in a discrepant event) is not necessarily sufficient to enable learners to revise previously held ideas or reach deep conceptual understanding. People often come up with quite ingenious and clever ways to retain their old ideas while at the same time adapting some aspects of more accurate conceptions. Monitoring learners' changing ideas and engagement through repeated experience, over time, is part of the path to building true understanding.

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

- incorporates the learning cycle
- focuses on nature and processes of science and on goals and concepts explicitly;
- offers opportunities to engage with and manipulate objects,
- allows for inquiry, including exploration and investigation, but also in making explanations and application;
- interactive, fun, and visitors *do* something;
- allows for multiple entry and exit points;
- inclusive of all learners; and
- presents science content accurately.

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

- encourages and provides opportunities for discussion and other social interactions between visitors or family and other group members;
- encourages learners to make meaning individually, with peers, and with someone more knowledgeable;
- experiences and conversations in a social setting;
- uses diverse teaching approaches;
- makes connections to current/prior knowledge;
- accommodates needs and interests of diverse learners; and
- presents science content accurately.

Session Objectives

In this session, participants:

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

Session Activities at a Glance

Quick Write (5 minutes)

Participants reflect on responses to the survey they developed about the concept they are interested in designing an activity about and how the survey results may affect their activity design.

Sharing Presentation Experiences (optional; 10 minutes)

Students have presented an activity at the museum/aquarium sometime over the past week; they discuss their experiences.

Introducing Designing an Activity Session and Think-Pair-Share of Key Characteristics of Exemplar Activities (15 minutes)

Participants are introduced to designing an activity and participate in a Think Pair Share about their ideas concerning the characteristics of an exemplary activity. Participant’s ideas regarding the following prompts are recorded on chart paper.

- What are some key characteristics of activities that you feel would make them exemplars?
- What are some key characteristics of the facilitator’s implementation that would make them exemplars?

This chart will be revisited after engaging in the exemplar activities and again each session as additional learning theory and pedagogy about teaching and learning are introduced.

Engaging in Exemplar Activities (45 minutes)

Participants have a chance to see more of the COSIA exemplar activities that are used in the museum and participate in a brainstorm to add to the ongoing list of “Key Characteristics of Exemplary Activities.” Participants then reflect on how various components from the list could be incorporated into the design of their own activity.

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.)

Designing an Activity and Using the Activity Design Starter (40 minutes)

Pairs use the *COSIA Activity Design Starter* to start to design their own activity and specifically focus on five “Questions to Consider.”

Peer Review of Activity Ideas (10 minutes)

Participants give each other advice about their activity ideas as they look for the presence or absence of components listed on the “Key Characteristics of Exemplary Activities” chart.

Optional Presentation: Exhibit Design

This presentation focuses on exhibit design in the museum, and specifically emphasizes prototyping and multiple revisions based on visitor observations and evaluation.

Preparation for Presenting in Class Next Week (20 minutes)

Participants have the opportunity to plan with their partner so that they are prepared to present their activity in class during one of the upcoming sessions.

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 (5 minutes)

Sharing presentation experiences (10 minutes)

Introducing Designing an Activity Session and Think Pair Share about Key Characteristics of Exemplar Activities (15 minutes)

Engaging in Exemplar Activities (45 minutes) [*or optionally, shorten exemplar activities and do Optional: Exhibit Design Example (20 minutes)*]

Deep Sea science content presentation (optional; 20 minutes)

Designing an Activity and Using the Activity Design Starter (40 minutes)

Peer Review of Activity Ideas (10 minutes)

Optional Presentation: Exhibit Design
Preparation for Presentating in Class (20 minutes)
Homework (5 minutes)

Materials Needed

For the class:

- ❑ digital projector
- ❑ PowerPoint slides for Session 4
- ❑ Activities and materials for presenting exemplar activities in class
- ❑ Chart paper and pens

For each participant:

- ❑ *COSIA Activity Design Starter*

Preparation of Materials

1. Make one copy for each participant of the following page:
—1 copy of COSIA Activity Design Starter
2. Collect materials for exemplar activities you plan to highlight in class.
3. Create a chart titled “Key Characteristics of Exemplar Activities” with two columns: “Key Characteristics of Activities” and “Key Characteristics of Facilitator’s Implementation” to record results of the Think Pair Share about exemplary activities.
4. Decide if you will do one or more of the following activities.

Optional Presentation: Exhibit Design

This presentation is focused on exhibit design in the museum and specifically emphasizes prototyping and multiple revisions based on visitor observations and evaluation. (See “Exhibit Presentation for Session 4” on website for the PowerPoint, if you’re interested in using this presentation.)

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 not to do either of these presentations, you'll have more time for the participants to discuss the reading assigned for homework, engage in the exemplary activities, work on designing their own activities or prepare to present in class next week.

Homework assigned last session to be completed by this session:

ACTIVITY DEVELOPMENT

1. Identify one of the concepts you are most interested in. Develop a three-question questionnaire with your partner and interview three categories of people – college peers, other adults, friends and families under 18 – to find out what they know about that concept. Record responses. This is an individual assignment. You will use this questionnaire as a reference when developing your activity.
2. Activity Proposal: develop a 1–2 page proposal outlining the concepts, content, and activity you would like to develop. (Each set of partners hands in one proposal.)

Instructor's Guide–Session Details

Quick Write

1. **Participants do Quick Write.** Display the Quick Write prompt regarding the responses they received to their survey about a concept they're interested in developing an activity about. Give participants about 5 minutes to respond.
 - What most surprised you about the responses people gave to your survey questions?
 - How might that affect what you are planning for your activity?
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 Presentation Experiences

1. Participants share presentation experiences. Over the past week, the students presented activities on the museum floor. Many students will choose to present activities that they saw during Session 1. Ask for volunteers to share some of their experiences from presenting for the first time. Use the discussion map below to help facilitate the discussion using the following prompts.

- a. Describe an interaction with a visitor 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 class 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 an Activity Session and Think-Pair-Share about Key Characteristics of Exemplar Activities

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

2. Introduction to key characteristics of exemplar activities. Share with participants that an important part of this session will be the opportunity to engage in exemplar activities. These experiences will then be used to determine what are the *key characteristics* of (a) the **activities** and (b) the **facilitator's implementation** that makes them exemplar. Participants will be given the opportunity to incorporate these key characteristics into their activity design.

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 exemplar activity.

- What are some key characteristics of activities that you feel would make them exemplar activities?
- What are some key characteristics of the facilitator's implementation that would lend themselves to being exemplar activities?

4. Record ideas from group debrief. Record participant's ideas on chart paper in two columns: "Key Characteristics of Activities" 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 exemplar activities. 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, and the nature and processes of science. 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 Exemplar Activities" 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 exemplar activities.

Engaging in Exemplar Activities

1. Introduction to viewing exemplar activities. Tell participants that they will rotate among four different activities – some new and some familiar to them from the first session or from their presentations on the museum floor. They are to engage in each activity as a participant and pay particular attention to what makes the activity and the facilitator’s implementation effective.

2. Rotating through activities. Ask the participants to engage in at least two activities and encourage them to jot down notes about the key characteristics they notice that makes the activity exemplar. Post the following prompts for them to keep in mind as they engage in the activities:

- What is the goal of the activity and/or concepts addressed?
- What did the facilitator do to engage you in the activity?
- What particular aspects of the activity made it effective?

3. Whole group debrief of observations. Encourage participants to share their ideas about what made the activities 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 using the following prompts.

- a. What is the goal of the activity and/or concepts addressed?
- b. What did the facilitator do to engage you in the activity?
- c. What particular aspects of the activity 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.

4. 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 activity or facilitation strategies to the design of their activity.

Deep Sea Science Content Presentation (optional)

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 activities, work on designing their own activities or prepare to present in class next week.

Designing An Activity and Using the Activity Design Starter

1. Introduce designing an activity. Tell participants that they will work with their partner to start designing their activity around the specific science concept they have chosen. This activity will provide them time to discuss their activity with their partner and to receive peer and instructor feedback on their activity.

2. Project slide, “Questions to Consider.” Point out that these five questions are what they should ask themselves as they think about designing an activity. Display the five questions and then ask them to think about how these same questions might fall out into different parts of the learning cycle.

- (1) What do you want the visitors to learn and experience? (i.e., your goals and concepts)
- (2) How will you get learners interested in participating in your activity?
- (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 activity?
- (5) What will you do as a facilitator to help them come to an understanding of the concept?

3. Project slide, “COSIA Activity Design Starter.” Distribute the *Activity Design Starter* sheet and tell them that this form will help them design and record their activity. Point out that the same five “Questions to Consider” from above are included on the form.

4. Discuss activity components on “Activity Design Starter.” Discuss each of the components participants will complete, and answer questions they might have. Remind them to keep in mind which aspects of their activity are accessible for pre-schoolers and their parents, and how they could make it interesting for high schoolers. (Emphasize that the whole activity does not have to be appropriate for all audiences, but they should think about providing at least some portion of the activity that all audiences can engage in at some level.) They are not expected to finish their activity design today – this is an opportunity to brainstorm, become familiar with portions of the COSIA activity write-up, and further refine their own activity.

5. Circulate. Circulate around the room, asking questions, listening, and giving advice if asked.

Peer Review of Activity Ideas

1. Participants share activity with another pair. Tell participants that they will now have the opportunity to share their activities 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 activities.

2. Partners review own activity again. Have each set of partners review their own activities again using the input given by their peers. Encourage frank assessment of their activity, 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, asking 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 Activity Idea Proposals. Tell participants they’ll use their work in class today as the basis for the homework assignment – to complete and upload the *Activity Design Starter*.

Optional Presentation: Exhibit Design

This presentation focuses on exhibit design in the museum and specifically emphasizes prototyping and multiple revisions based on visitor observations and evaluation. (See “Exhibit Presentation for Session 4” on web site for the PowerPoints if you are interested in using this presentation.)

Preparation For Presenting in Class Next Week

- 1. Planning for the presentations.** Tell participants that they will now have the chance to plan with their partner for their presentation next week or the week after in class. Tell them to specifically consider materials, visuals and models that they will need to collect, gather and develop.
- 2. Circulate around the room.** Circulate around the room, giving advice where requested and answering any questions. If needed show them again where their materials are located and how to obtain organisms for the activities.
- 3. Reminders for next week.** Remind students to arrive a few minutes early for their presentations next week so they have time to set up. Encourage them to email if they have any last minute questions.

Homework

Online discussion

- Describe some of your experiences in presenting your activity so we all have a better understanding of the challenges and successes of your interactions with the public.
- Were you able to incorporate some of the key characteristics of exemplary activities into your presentation? Please explain.

Reading

- Roschelle, J. (1995). Learning in interactive environments: Prior knowledge and new experience, in J. H. Falk & L. D. Dierking (Eds.), *Public institutions for personal learning: Establishing a research agenda* (pp. 37–51). Washington, DC: American Association of Museums.
- Seaweeds reading from textbook pp. 102–109, 111

Activity Development

Activity Design Starter to be completed and turned in next week.

COSIA Activity Design Starter

Answer these questions on a separate piece of paper, in paragraph form. Each pair of partners will submit the same document.

(1) What do you want the visitors to learn and experience? (concepts and goals)

a. **Concepts:** What concepts are you 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 learning goals for this activity? (These might include things like "Opportunity to interact with animals," "Investigate using hands-on inquiry," "Promote a deeper appreciation for _____")

(2) How will you get the learners interested in participating in your activity? (*What is your "hook"? Will you have a big poster, exciting objects displayed, an interesting challenge to solve, etc.?*)

(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 activity? (*e.g., talk with you &/or other learners, touch the animals, do an investigation, make something, etc.*)

(5) Briefly describe the general flow of the activity. (*e.g., how does it start, what will the learners do, what will you talk about with the learners, and how does it end?*)

Key Characteristics of Exemplar Activities

1. Learner Driven

- Encourages questions from visitors and follows the interests of the learner
- Is sensitive to the visitors' prior ideas and knowledge about this topic
- Evokes "metacognition" (thinking about one's own knowledge/ideas) and reflection
- Gives visitors a sense of authority/ownership of their own learning
- Has relevance to visitors' 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 visitors' current/prior understanding of the content
- Encourages and provides opportunities for discussion/discourse and other social interactions between visitors or family/group members
- 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 visitors to make meaning individually, with peers and with someone more knowledgeable (e.g. facilitator/knowledgeable visitor)
- Uses the "specialness" of objects to elicit conversations that support learning
- Includes opportunities that explicitly address nature and processes of science
- Allow opportunities for visitors 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, fun, and contains a "hook"
- Visitors *do* something

6. Multiple Entry and Exit Points

- Visitors could walk up or leave, at almost any time, and still have a significant learning experience without needing to see the Activity from beginning to end.

7. Inclusive

- Is “developmentally appropriate,” meaning the vocabulary and activities are appropriate for the knowledge level and physical abilities of the visitor
- Considers cultural and social aspects of interactions