INSTRUCTOR GUIDE

SESSION NINE

STUDENT LEARNING GOALS

- Apply principles of constructivist learning to exploration of air and motion.
- Understand that teaching science and math may be approached differently in early childhood programs depending on educational philosophies.
- Differentiate between naturalistic, informal, and structured learning experiences.

Materials List

General
- Computer with internet access/speakers
- PowerPoint slides for Session 9 (downloaded from website)
- Data projector
- Sign-in sheet (customizable printable)
- Course Reader
- Big Ideas of Early Mathematics textbook
- Colored markers for each table group

For the Arrival Activity
- 8.5” x 11” white paper (1 per student)

For the Science Focus
- Air and Wind exemplar activity guide
- 1 cotton ball
- Straws (1 per student)
- Masking or painter’s tape (1 per group – assorted colors if available)
- Easel paper (several sheets per group)
- Optional: extra objects, turkey basters, and other air pushers
- Students provide: assorted small objects for air blowing
### Session at a Glance

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Estimated Time (In Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival Activity</td>
<td>Students draw a picture illustrating something about doing their exemplar activity with children. They share their pictures during small group discussion about Midterm projects.</td>
<td>10</td>
</tr>
<tr>
<td>Welcome, Announcements, and Agenda</td>
<td>Give a general overview of the session and any relevant announcements, and provide time for sharing.</td>
<td>10</td>
</tr>
<tr>
<td>Discussion: Sharing about Midterms</td>
<td>Students generate questions to ask each other about their experiences doing their exemplar activity with children. In small groups they talk with each other about what they did and learned.</td>
<td>40</td>
</tr>
<tr>
<td>Science Focus: Air and Wind</td>
<td>Students participate in the exemplar activity: Air and Wind. They follow their curiosity to come up with fun challenges using the objects and air pushers they brought to class. They brainstorm ideas for integrating math into this activity.</td>
<td>30</td>
</tr>
<tr>
<td>Discussion: Teaching Science and Math in the context of different educational approaches</td>
<td>Students reflect on how the approach to science and math presented in this course fits with different educational philosophies they may be familiar with.</td>
<td>15</td>
</tr>
<tr>
<td>Discussion: Concept development through naturalistic, informal and structured learning experiences</td>
<td>Students are introduced to three types of learning experiences: &quot;naturalistic,&quot; &quot;informal&quot; and &quot;structured.&quot; Students brainstorm examples of these three types of learning experiences on the topic of air and wind to reinforce the idea that children need all three kinds of experiences in order to build conceptual understandings and skills.</td>
<td>35</td>
</tr>
<tr>
<td>Looking Ahead to Next Session</td>
<td>Go over the materials that students will be responsible for bringing next session.</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total Estimated Time:** 2 hr 30 min

### Before Session
- Review the materials relevant to this session:
  - Exemplar activity guide: Air and Wind
  - PowerPoint for Session 9 (downloaded from website)
  - Reader section: Session 9
- Make copies of any printables and/or handouts.
- Set up materials:
  - Place markers and paper on tables for the Arrival Activity.
  - Place the following materials where you will be doing the Engage part of the exemplar activity:
    - cotton ball
    - straw
  - Optional: several small objects to blow on and a couple other tools to use as air pushers (you can use some of the student provided materials)

### As Students Arrive
- Have students sign in on attendance sheet and check off if they brought their items for playing with air and wind.
- Have students turn in their Midterm reports.
**Arrival Activity:** Draw a picture illustrating something about doing your exemplar activity with children. Make whatever kind of visual representation you want. Don’t worry about “how good” it is! (Students will use their pictures when they share about their Midterm projects.)

1. **Announcements and sharing.**
   - If you have students who are working with children, ask if anyone tried any activities from previous sessions and to share their observations and insights.
   - Share any observations, clarifications, or notable comments that you feel should be mentioned related to the previous session’s homework.

2. **Review agenda.**

3. **Facilitate small group sharing about Midterm projects.**
   - Tell students that they will talk with each other about their experiences doing their exemplar activity with children. They can use the pictures they drew for the Arrival Activity in their discussions. (Suggestion: Make groups of 3-4 students to allow for in depth conversations. You may want to partner students with people they haven’t yet worked with in order to further build the classroom community.)
   - Have students generate some “interview questions.” Ask them to think about what they would like to share about their own experience and to hear about from classmates about their Midterm projects. As students suggest questions, write them on the board, or ask them to write them on the board, where everyone can see them. Try to get between 5-10 questions listed. Add some questions of your own as well, such as:
     - What went well? What didn’t? Why?
     - What was the biggest challenge?
     - What surprised you?
     - What would you do differently next time?
   - Once the questions are listed on the board, let students know that they can ask each other questions in any order and that it is not necessary to ask all of the questions. Let them know how much time they have for discussion. Explain that the purpose of this discussion time is for students to learn from each other and to broaden their perspectives by hearing about different classroom situations.
   - Remind them of the following guidelines. Each group member has a responsibility to:
     - Contribute to the discussion
     - Listen to each other
     - Keep the group on task
     - Try to give equal time to everyone in the group
   - As students are talking together, circulate around the room to briefly listen in on the conversations.
4. Introduce the Air and Wind exemplar activity.
Let students know that you are going to model the Engage part of the activity in much the same way as if you were doing it with children in order to help them experience the activity through a child’s eyes and to demonstrate the teaching strategies as written in the exemplar activity guide.

Engage
- Tell the students that they will be exploring air. Encourage them to share their prior knowledge and experiences with air by asking them questions such as:
  - What do you know about air?
  - Can you see air? Feel it? Hear it?
  - Why is air important?
- Ask the students how they know that the air is there if they can’t see it? Have them wave their hands like fans in front of their faces. If they have not already mentioned it, ask what air is called when it’s moving (wind).
- Ask them how they know when the wind is blowing outside. Ask them what kinds of things they’ve seen move in the wind.
- Show a cotton ball. Place the cotton ball on the floor or on a table in front of you and ask how you can get the cotton ball to move without touching it. They will likely tell you to blow the cotton ball. Say something like, “Oh! I can use the air from my body like wind to push the cotton ball.” Blow on the cotton ball while the students watch how far it moves.
- Show a few other small objects, some light and some heavier. Ask students to predict which objects the air will, and will not, be able to push and why. You may choose to record their predictions.
- Explain that they are going to be exploring with air and how it can be used to push or move the objects they brought from home.
- Ask students to hold up the tools that they brought from home so everyone can see the different kinds of air pushers there are.

Explore
- Invite students to freely explore with the different objects and air pushers at their tables.
- Give everyone their own straw to experiment with as well. They can use masking tape to label their straws with their name.
- As they test different objects and air pushers encourage them to predict, observe, compare, and talk about their discoveries.
- As students are exploring, circulate around the room and ask questions, focus observations, and encourage use of science process skills (predicting, noticing cause and effect relationships, and communicating about their process and discoveries).
- Ask questions such as:
**How can you get the object to move?**

**Which objects do you think will move the farthest? Why?**

**Which objects do you think will be difficult to move? Why?**

**Did the tool you use make a difference?**

- After the students have explored for a while, and are ready to move on, get their attention and introduce some challenges they can try.
  - **Air Tracks:** Draw a path on a large sheet of paper and try blowing through a straw to make an object follow the track.
  - **Air Races:** Using two parallel lines (drawn on butcher paper, or made with masking tape), race a friend to see who can move an object from one end to the other first, just using the force of air!
  - **Recording:** Define a starting line, and then mark several lines with colored tape or markers. Choose an object, place it on the starting line, and select an air pusher. Use just one push (or blow) of air to see how far the object moves. Measure, record, and compare how far different objects travel depending on which air pusher is used.

- Give each group a roll of masking tape and/or markers and several sheets of easel paper for making tracks, etc. Encourage them to be creative and come up with their own ideas for other games and challenges. Tell them how much time they have to do these activities.
- Encourage groups to share the games and challenges they invent with each other.

**Reflect**

- Encourage students to share about their experiences using the different air pushers and objects. Ask them questions such as:
  - What was your favorite air pusher? Why?
  - Which games and challenges did you enjoy most? Why?
  - How would you support and guide children’s explorations with these materials?

**5. Discuss opportunities for integrating math into air blowing activities.** Ask students for ideas about how a teacher might integrate math into the air blowing activities. For example (bullets are animated to appear on click):

- Counting
- Measuring
- Sorting

**Clean up:** Direct students to clean up the materials at their tables.
6. Sing a song about the wind.

**Riding the Wind**

*(Tune: “5 Little Ducks Went Out to Play”)*

I sometimes sit and wish that I could jump up high into the sky.
And ride upon the breeze and go whichever way the wind did blow!

7. Show photos of children engaged in the Air and Wind exemplar activity. Ask for students’ ideas on modifications for different ages and developmental levels.

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**Early Childhood Topic**

8. Discuss different early childhood program philosophies in the context of their approach to science and math.

- Point out that the activities and teaching strategies that students are learning in this course can be adapted to a variety of educational approaches and philosophies.
- Ask students if they are familiar with any of the approaches shown on the slide: Play-based, Project-based, Montessori, Waldorf, Creative Curriculum, High Scope, Reggio Emilia. Encourage students who have knowledge and experience with any of these philosophies to share a little about them. Ask if anyone has any others to add that have not already been mentioned. It is not necessary to define each approach, but rather to make the point that each one reflects a particular theory and practice.
- Emphasize that none of these perspectives are necessarily exclusive. Whereas some programs strictly follow a certain approach, it is also common to have a more eclectic approach that incorporates elements of different approaches. Teachers often incorporate elements and knowledge from a multitude of resources and theories as well their own experiences to create their own philosophy.
- Ask those students who are currently working with children to describe how the approach to science and math presented in this course fits with their program’s philosophy.


- Explain that across all types of educational approaches, it is important to recognize that young children learn science and math concepts through three types of learning experiences:
  - **Naturalistic experiences**
    - initiated spontaneously by children as they go about their daily activities
    - the child controls the choice and the action
  - **Informal experiences**
    - take place when a child is engaged in a natural activity
    - adult recognizes an opportunity for a “teachable moment”
  - **Structured experiences**
    - preplanned lessons or activities in which the adult has specific learning objectives in mind
    - can be done with individuals or large groups
the adult’s role is to create a rich environment for play, exploration, and learning

- Example: Child is playing outdoors on a windy day chasing leaves as they blow in the wind.

**Informal Experiences**
- take place when a child is engaged in naturalistic experiences
- adult recognizes an opportunity for a “teachable moment”
- Example: Child is playing outdoors on a windy day chasing leaves as they blow in the wind. Teacher plays game of “I Spy,” giving clues about other things that are blowing in the wind.

**Structured Learning Experiences**
- preplanned lessons or activities in which the adult has specific learning objectives in mind
- the adult chooses the experience and gives some direction to the child’s action
- can be done with individuals or small or large groups
- Example: On a windy day, teacher brings materials outside for children to make kites out of paper bags and streamers. As they play with their kites, teacher intentionally draws children’s attention to the direction the streamers are blowing and connects this to the weather vane in the yard.

10. Have students brainstorm their own examples of naturalistic, informal, and structured learning experiences to reinforce the ideas presented.

- Have students refer to the “How Children Learn Concepts” handout in their Course Readers. Explain that they will work with a partner to brainstorm their own examples of each type of learning experience using the topic of air and wind.
- Encourage them to try to think of at least 2 examples in each category. Ask them to also talk with their partner about what concepts and skills children might be developing in the examples they come up with.
- Let them know how much time they have for brainstorming. Circulate around the room to listen in on discussions and to answer questions that may arise. Give a few minutes warning before time is up.
- Have each pair of students share their examples with the others at their tables. Let them know how much time they have.
- After table sharing, provide the opportunity for students to share out to the whole group on any interesting things that came up in their discussions or new insights this activity gave them.
- Sum up by reiterating that science and math content can be introduced effectively into naturalistic, informal, and structured learning experiences, and that children need all three kinds of experiences to build conceptual understandings and skills.
11. Looking ahead to next session.
   • Review materials to bring next session: Emphasize that student-supplied materials are essential for the hands-on activities in each class.
     o 5 leaves with interesting features