INSTRUCTOR GUIDE

SESSION SEVEN

STUDENT LEARNING GOALS

- Understand the value of constructivist learning in the context of making mixtures.
- Have a direct experience with transforming substances and observing the results of their own actions.
- Communicate Making Mixtures Group Activity classroom application ideas in class presentation.

Materials List

General

- Computer with internet access/speakers
- PowerPoint slides for Session 7 (downloaded from website)
- Data projector
- Sign-in sheet (customizable printable)
- Course Reader
- *Big Ideas of Early Mathematics* textbook
- Optional: Easel paper (1 sheet per group) and markers (several per group)

Other Printables and Handouts

- Making Mixtures Group Activity grading sheets (customizable printable)
### 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 look at names of common household substances and try to match them to their chemical names.</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: Constructivist Chemistry</td>
<td>Students share ideas and insights they had from the reading on cooking transformations and are introduced to the broader topic of Constructivist Chemistry.</td>
<td>15</td>
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<tr>
<td>Making Mixtures Group Activity</td>
<td>Students work in their groups to make their assigned mixtures. They then take time to plan out a brief presentation. After the presentations, students explore the different mixtures and exchange more ideas about doing these activities with children.</td>
<td>115</td>
</tr>
<tr>
<td>Looking Ahead to Next Session</td>
<td>Review the materials that the students will be responsible for bringing to the next session. No reading or written homework is assigned to give students time to work on their Midterms.</td>
<td>10</td>
</tr>
</tbody>
</table>

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

### Before Session
- Review the materials relevant to this session:
  - PowerPoint for Session 7 (downloaded from website)
  - Reader Section: Review Making Mixtures Recipes in Section 6 (No Reader Section for Session 7)
  - Making Mixtures Group Project guidelines and grading sheet
  - Midterm Assignment
- Make copies of any printables and/or handouts.
  - You will need one grading sheet per group.

### As Students Arrive
- Have students sign in on attendance sheet and mark if they brought their items for the Making Mixtures group project.
- Have students turn in homework at the **end** of class since they will be discussing the assignment during class.
Getting Started

**Arrival Activity:** Direct students to talk with each other and try to match the names of common household substances with their chemical names. Remind them that this is just for fun, as a warm up for thinking about chemistry in early childhood.

- After students have had time to do the matching activity, show the next slide with the answers.
- Make the point that:
  - This activity may have been easy or challenging depending on students’ past learning.
  - It is not necessary to know chemical names or formulas in order to provide young children with foundational early chemistry experiences.

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.
   - Check in on students’ plans for their Midterm Project. By now, they should have made arrangements for when and where they will teach one of the exemplar activities.

2. **Review agenda.**

3. **Homework sharing.**
   - Have the students refer to their homework. In small groups, or as a whole class, ask them to share:
     - ideas the reading gave them about including cooking as part of the science curriculum.
     - how constructivist principles apply to cooking with young children.

4. **Introduce the idea of Constructivist Chemistry.**
   - Explain that the same principles of constructivist cooking can be more broadly applied to making mixtures of all kinds (not just edible ones). In this context:
     - Chemistry for young children is about exploring the properties of different substances and experimenting to see how they change.
     - Children discover that combining substances can produce a new substance with different properties.
     - These changes are referred to as transformations.
• Emphasize that the focus is on: making observations, comparing materials, using descriptive vocabulary, generating hypotheses, cause and effect, predicting, drawing conclusions, and sharing results with others. This is early chemistry.

5. Explain that the mixtures the students will be making in class today are intentionally designed to let children do a lot of experimenting rather than following an exact recipe.
• Ask students about the value of providing experiences in which children can combine ingredients without following an exact recipe. Incorporate the following points into the discussion:
  o Creates an environment for self-direction. Making their own choices and decisions is empowering.
  o Places children in the role of experimenter and scientist.
  o Encourages children to develop their own questions, test out their reasoning, encounter contradictions, and revise their ideas to construct knowledge.
  o Children will get different results from their peers creating rich discussions about what might account for the differences.

Making Mixtures Group Project

6. Give a breakdown of the time frame for the Making Mixtures Group Activity and go over expectations. Adjust suggested timing below as needed based on the number of groups that will be giving presentations. For example, if you have 5 groups:
• Each group makes their mixture. (20 minutes)
• Groups plan brief presentations. Refer to the assignment sheet for questions to be answered. (20 minutes)
• Groups present. (10 minutes each = 50 minutes)
• Hands-on time to explore mixtures. (15 minutes)
• Clean up. (10 minutes)

In this example, the time adds up to 115 minutes total.

7. Groups make their mixtures.
• As students are working, rotate from group to group to observe how they are working in their teams and to answer any questions they may have. The goal is for students to experience the excitement, discovery, and learning in much the same way children do.
• Encourage active participation of all students.
• Keep students informed of how much time is remaining before they need to start planning their presentations.

8. Review the expectations and grading for the presentations as described on the Making Mixtures Group Activity guidelines.
• Get the students attention when it is time for the groups to start planning.
• Go over the format for the presentations and answer any questions they may have about what is expected.
  o Bring your group’s mixture and ingredients to the front of the class.
  o Address all questions on assignment sheet.
  o Everyone needs to participate equally.
  o Keep presentation to under 10 minutes.

9. Students plan presentations.
• Instruct the students to clean up everything except for the mixture itself.
• You may want to provide chart paper and markers for making visual aids.
• Let students know how much time they have.

10. Groups give their presentations.
• Use the Making Mixtures grading sheet to evaluate the presentations.
• You may want to assign someone to keep track of time to keep presentations to 10 minutes.
• All students should take notes on the Making Mixtures guidelines in their Course Reader during the presentations to record the ideas and suggestions shared. These notes will be helpful when using these activities with children.
• If there is time, allow for questions after each presentation.

11. Allow hands-on time for students to explore each group’s mixture and to exchange more ideas about doing these activities with children.

Clean up: Direct students to clean up their mixtures and the tables and surrounding area if necessary.

12. Reflect on the Making Mixtures experience.
• “What did you learn from the Making Mixtures activities we did in class today?”
• “How did this experience affect your ideas about science and young children?”
• “What questions did this activity raise for you?”

14. Looking ahead to next session.
• Review homework assignment due next session.
  o Turn in a short description of your plan for conducting your Midterm project with children. This description is required so everyone is on track to do their classroom activity. Include the name and address of the center, date you will be doing the lesson, ages of children and how your activity will fit into the daily
schedule (for example, will you do it during choice time, outside time, etc.).

- **Review materials to bring for next session**: Emphasize that student-supplied materials are essential for the hands-on activities in each class.
  - Half of the students will bring a box of baking soda and half will bring 2 cups (or a small bottle) of white vinegar.
  - Emphasize how important attendance is since the groups are counting on the ingredients.