



Science: Exploring the Research Base for the Science Domain

Science Domain:
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Focus Statement

Students become familiar with the rationale and research base for the preschool science foundations by reviewing the introductory and Bibliographic Notes sections of the science domain and preparing a poster.

Curriculum Alignment Project (CAP) Student Learning Outcomes

The Curriculum Alignment Project's (CAP) lower division eight courses and student learning outcomes are mapped onto each instructional guide learning experience. See Appendix A for the specific student learning outcomes, objectives, and examples of course content and topics for the courses listed below.

- Child Growth and Development
- Introduction to Curriculum
- Principle and Practices of Teaching Young Children
- Practicum-Field Experience

Instructional Methodologies

- Class discussion
- Class presentation
- Creation of a visual representation
- Development of resource tool
- Jigsaw reading
- Notetaking outline or guide
- Pairs or small groups
- Peer review and feedback
- Personal reflection
- Reflective discussion
- Short paper or report



California Early Childhood Educator Competency Areas to Consider

The Faculty Initiative Project will undertake a comprehensive process in the future to map the content of the instructional guides to the California Department of Education, Early Education and Support Division's *California Early Childhood Educator Competencies*. The "Competency Areas to Consider" below are listed in this instructional guide as a preliminary exploration of how particular competency areas might be addressed through these learning experiences.

- Child Development and Learning
- Learning Environments and Curriculum
- Leadership in Early Childhood Education
- Professionalism
- Administration and Supervision



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Before You Start

Children's **predisposition** to learn certain kinds of knowledge, and to think abstractly about concepts from biology and physics, support the early learning of science and pave the way for competence in early schooling. Children's natural inclination and ability to observe and try to understand their world, to develop conceptual knowledge, and to reason about many scientific concepts make science an excellent fit for the preschool environment. As such, there is growing recognition at the national level that science is appropriate and important for preschool children (National Research Council 1999, 2000, 2007) (*California Preschool Learning Foundations, Volume 3, p. 48*).

As students explore the foundations, acquiring a familiarity with some of the research base can help students better understand the foundations and the differences between the foundations for 48 months and for 60 months. The material in the Bibliographic Notes of the *California Preschool Learning Foundations, Volume 3* provides references to the research literature as well as additional information about children's developmental knowledge and skills for the four strands: Scientific Inquiry, Physical Sciences, Life Sciences, and Earth Sciences.

In this learning experience, students will select one of the strands, review the research citations in the Bibliographic Notes for that strand, and prepare a poster that presents a summary of that information as it relates to the foundations in the strand. It is suggested that time between class sessions be provided for students to work in teams on their posters.

Instructors may choose to develop specific guidelines for the posters or suggest that students review the description of a poster session from the Colorado State University's Writing Studio, an open-source learning environment—Writing@CSU <http://writing.colostate.edu/guides/guide.cfm?guideid=78>. In this learning experience, it is suggested that the posters be less technical than those at some professional conference poster sessions and geared for an audience of early childhood educators with varying degrees of experience related to science in the preschool classroom.

Information Delivery

The following sections from the *California Preschool Learning Foundations, Volume 3* are referred to in this learning experience:

- Introductory sections to the foundations (pp. 48–60)



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- Glossary (pp. 95–96)
- Bibliographic Notes (pp. 84–94)
- References and Source Materials (pp. 97–101)

Suggestions are made to have students become familiar with these sections through out-of-class reading assignments, jigsaw reading during a class session, or a recap of previous explorations of this material through another learning experience in this instructional guide.

Active Learning

Getting it started

Begin this learning experience by asking students to review the introductory sections to the preschool science foundations on pages 48–60 and the glossary on pages 95–96 of the *California Preschool Learning Foundations, Volume 3*. If the students have done Learning Experience 4 in this instructional guide titled “Exploring the Content and Vocabulary of the Science Domain,” remind them of the key points and vocabulary they already identified and discussed. But if this is the first time students are working with the science foundations, students could read the sections outside class or as a jigsaw reading during a class session. Students could work in small groups for the jigsaw approach—each group assigned to one or more of the following sections:



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- Introduction, page 48
- Science in Preschool, page 49
- Development of the Whole Child (Science and Other Domains), pages 49–50
- The Preschool Foundations for Science, pages 50–51
- Individual, Cultural, and Linguistic Variations, pages 51–52
- Scientific Inquiry: The Skills and Language of Science, pages 52–53
- Communicating: The Role of Language in Scientific Inquiry, pages 53–55
- Scientific Knowledge: The Content of Science in Preschool, pages 55–56
- Physical Sciences: Early Concepts in Physics, pages 56–57
- Life Sciences: Early Concepts in Biology, pages 57–58

Online Options

If instructors choose to have students do jigsaw reading, students could post notes of their reading online for instructor and other students’ review.



- Earth Sciences: Early Concepts Related to Earth, pages 58–60

After the students have finished their review or done the reading of their assigned sections, ask students to either report on or discuss the following questions:



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- What key points did you take from your reading?
- What was some new or unfamiliar vocabulary that you came across?
- Which of the four strands particularly intrigued you?

Online Options

If the class has online-discussion capability, instructors could lead an online discussion with students of these three questions.

Keeping it going

Next have students form small groups of three or four who expressed interest in the same strand. Depending on the number of students who self-select for each strand, there may be more than one group who will work on the same strand.



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Explain to students that they are to read the section of Bibliographic Notes on their strand and then develop a poster that presents some of the research base and rationale for that strand. The posters should be somewhat similar to those seen at conferences or other forums. If students are not familiar with poster sessions, instructors may wish to explain that posters at professional conferences can range from highly technical research and information for an audience of experts on the topic to general information for a varied and more general audience. The posters the students are designing should be developed for an audience of early childhood educators who have a range of expertise and experience in science for preschoolers. The posters should include text and graphics that present highlights from some of the research articles referenced in the Bibliographic Notes and the relationship of the research to specific foundations in the strand.

Because the posters will require time for planning and assembly, consider doing this learning experience over a couple class sessions—perhaps doing the “Getting it started” section as part of one class, assigning the poster to be done out of class, and then having students present their posters during part of a second class.

Putting it together

Conduct a poster session as it is done at a conference, allowing students time to view the different posters and interact with the



presenters. Students from each group could take turns remaining with the poster to describe it and answer questions. Allow enough time for the rotations so that all students have an opportunity to look at the posters and be the presenter.

Taking it further

After all the students have reviewed all the posters, conclude the poster session with a class discussion:



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- Which elements from the posters stood out for you? Was there one poster that particularly caught your interest? Why?
- What was the easiest part of creating your poster? The most challenging part?
- How did developing a poster help you understand the research and rationale for the strand you selected?
- What other questions came up for you as you reviewed the Bibliographic Notes and prepared your poster?

Another approach/way

Instead of preparing posters for an audience of early childhood educators, ask students to prepare the posters for parents and other family members. The posters would be part of a back-to-school night, and the purpose of the posters is to explain to parents what children will be learning in the science domain based on the foundations.

Students could present their posters as suggested in the “Putting it together” section or each group could present and describe its poster to the rest of the class. If the second approach is used, allow time for the audience to ask questions, point out highlights of the poster, and make one or two recommendations for improving the poster.

Reflection



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These questions could be used for individual or group reflection:

- Which facts from the research highlights on the posters do you remember?
- Which facts were familiar? Which ones were new or caused you to have a different perspective?
- What specific information helped you better understand one or more of the preschool science foundations?
- After viewing all the posters for the different strands, which strand other than the one you already selected would you



choose to explore further? What is a first step you will take in that exploration?

Deeper Understanding



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Ask students to select three journal references from the list of References and Source Materials on pages 97-101 of the *California Preschool Learning Foundations, Volume 3*. The references should focus on one of the four strands. Ask students to write a short paper that includes summaries of each reference:

- Title and author(s) of the article
- Publication information
- Brief summary of the article
- Key findings that relate to one or more of the foundations in that strand
- How the article supports the student's understanding of the foundations in the strand

If possible, ask the students to share their summaries or compile them in a way that is accessible to all the students.