Science:
Exploring the Influence of Family and Culture on the Science Foundations

Focus Statement

Students identify and consider a variety of family and cultural beliefs, values, practices, and circumstances that relate to children's learning in the science domain and examine the foundations and examples through those perspectives.

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
- Child, Family and Community
- Principle and Practices of Teaching Young Children
- Teaching in a Diverse Society
- Practicum-Field Experience

Instructional Methodologies

- Brainstorming
- Class discussion
- Class presentation
- Pairs or small groups
- Personal reflection
- Reflective discussion

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
- Culture, Diversity, and Equity
- Family and Community Engagement
- Learning Environments and Curriculum
- Professionalism

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Before You Start

> Children vary in their cultural backgrounds. As much as the development of scientific concepts is universal and salient in all cultures, cultural background may shape the development of some scientific concepts. Research indicates that the language to which children are exposed and culturally shared belief systems may play a role in children's development of core biological concepts and reasoning (Anggoro, Waxman, and Medin 2005; Waxman and Medin 2006; Hatano and others 1993) (*California Preschool Learning Foundations, Volume 3*, pp. 51–52).

Children in California are remarkably diverse in their individual qualities such as temperament and personality as well as in their family and cultural backgrounds. Teachers need to be aware of, sensitive to, and respectful of this diversity that is seen in families' home languages, values, cultural beliefs and traditions, and everyday practices.

In this learning experience, students will review the foundations and consider different family, community, and cultural factors that may impact children's acquisition of some of the competencies described in the foundations. Some of these factors may bring up uncomfortable or sensitive memories or issues for some students, so it is important that information be presented in as objective a manner as possible. It may be helpful to preface this discussion with the reminder that increased understanding of families' different belief systems and practices will help students be better prepared to partner with families in supporting children's development in the science foundations.

It is suggested that students also review some of the examples for the foundations. If instructors have access to several copies of the *California Preschool Learning Foundations, Volume 3*, students could use them for this review. The publication is also available online at http://www.cde.ca.gov/sp/cd/re/psfoundations.asp#psfoundvol3. Students with electronic devices such as laptops or tablets may be able to view the downloaded publication during class.

Information Delivery

Students will be asked to identify different examples of diversity that characterize California's children and families. The section on pages 3–5 of the *California Preschool Curriculum Framework,*

Volume 1 describes some of these characteristics and may be used as background reading or part of a lecture.

Examples from the *California Preschool Learning Foundations, Volume 3* are also referred to in the discussions of cultural beliefs and science. The last paragraph in the right-hand column on page 51 through the top of the right-hand column on page 52 discusses possible roles that culture and language may have in children's acquisition of science concepts. Additional studies that illustrate cultural influences on certain science concepts are found in the last paragraph in the left-hand column on page 90 through the top of the right-hand column on page 91.

Active Learning

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Getting it started

Begin by asking students to think about the many kinds of diversity that children and families bring to California's preschool programs. Instructors may want to give students time to review pages 3–5 in the *California Preschool Curriculum Framework, Volume 1* for some examples. Chart all the students' ideas and, as a group, identify the ones that students believe have an impact on children's development of science skills and knowledge. For example, a family's socioeconomic status could impact where a child lives and the opportunities for the child to play and explore outdoors, especially if the family lives in a very urban community. The child may not have had as much firsthand experience with the effects of weather and seasonal changes on plants. An example of the influence of culture and language on children's beliefs about the concept of life is described on page 90 of the *California Preschool Learning Foundations, Volume 3.*

Slide 7-8

Online Options

If the class has document-sharing capability, students could individually brainstorm ideas and add them to an online list. After instructor review, students could also "vote" online for the ideas that they believe impact the science foundations.

Keeping it going

Next ask students to find a partner or form a small group with two or three other students. Each group is to review a certain number of the preschool science foundations and examples and discuss ways that each of the considerations listed on the chart might impact the child's development of the skill or knowledge described in each foundation. Suggest that the group come

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Online Options

Each group could post a written summary of their work online for the instructor and other classmates to review.

up with examples, when possible, to illustrate their thinking.

Putting it together
Provide time for each group to share its work and invite the other students to ask questions and add other ways children's family and cultural backgrounds might influence children's demonstration of certain competencies.

Online Options

If the class has online-discussion capability, students could discuss other students' summaries. If this approach were used, it would be important for the instructor to clearly identify each summary with some kind of agreed upon system so that students can readily comment on the appropriate one.

Taking it further
After all the groups have presented their ideas, ask the class to think about this statement from pages 51–52 of the *California Preschool Learning Foundations, Volume 3:*

Slide 10-12

> Children vary in their cultural backgrounds. As much as the development of scientific concepts is universal and salient in all cultures, cultural background may shape the development of some scientific concepts. Research indicates that the language to which children are exposed and culturally shared belief systems may play a role in children's development of core biological concepts and reasoning (Anggoro, Waxman, and Medin 2005; Waxman and Medin 2006; Hatano and others 1993).

Ask students to discuss how they would approach different cultural beliefs in their work with young children and the science foundations. For example, if a child consistently " . . . attribute[d] to inanimate entities (e.g., a rock) attributes that are unique to living things" (*California Preschool Learning Foundations, Volume 3,* page 90*)*, how might you determine the child's understanding of the foundation in the Physical Sciences strand, "Properties and Characteristics of Nonliving Objects," and the foundation in the Life Sciences strand, "Properties and Characteristics of Living Things"?

Another approach/way
Instead of assigning a certain number of foundations to each group of students, instructors could assign one or two of the family and cultural considerations identified by the class to each group. Each group then reviews all the foundations with the lens of the considerations it was assigned.

Online Options

If the class has document-sharing capability, each group could post its summary of the foundations it feels might be impacted by the specific family or cultural considerations assigned.

Reflection

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The following questions can be used for a closing class discussion or individual reflection:

- Which consideration on the list stands out the most for you? Why?
- Which considerations and examples were familiar to you? Which were new or caused you to have a different perspective?
- Which preschool science foundations do you think would be most impacted by a child's family, community, linguistic, and cultural background and experiences? Why?
- How would you learn about some of the cultural beliefs of children in your classroom that might relate to the science foundations?