

## **Effective Science Teaching for English Language Learners**

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**Question(s) for Discussion:** How can we most effectively teaching science to K-6 English language learners?

**Session Description:** In this session, a panel of researchers will present on the development, implementation, and findings of the first year of the ESTELL (Effective Science Teaching for English Language Learners) project. The project is designed to conduct an experimental design research study on the implementation of multi-year, multi-level models of elementary teacher education to prepare novice teachers to teach science to culturally and linguistically diverse students with a particular emphasis on K-6 students who are English language learners (ELL). The project is being implemented at California State University San Diego (SDSU), San Francisco State University (SFSU), San Jose State University (SJSU), and the University of California, Santa Cruz (UCSC). The ESTELL project has developed an instructional approach to teaching science to ELL based on prior research in two areas: (1) the integration of inquiry science, language, and literacy practices and (2) the CREDE Five Standards for Effective Pedagogy (CFSEP). Research on both of these approaches has identified a set of instructional practices that a substantial body of empirical research has demonstrated raise the achievement of culturally and linguistically diverse students and improve their motivation to learn. These practices include collaborative inquiry, promoting science talk, literacy in science, scaffolding and development of language in science, contextualizing science activity, and promoting complex thinking. The panel will describe the following:

1. The development of the ESTELL experimental pre-service teacher education program, which integrated the ESTELL practices into pre-service science teacher methods courses, field practicum, and professional development with program faculty and cooperating teachers.
2. The research design and instruments that ESTELL researchers are using to track the development of pre-service teachers' knowledge, beliefs, and practices through their teacher education program into their first year of teaching. The study uses an experimental design to compare the knowledge, beliefs, and practices of pre-service and first-year teachers who participate in the ESTELL experimental program with a sample of control group pre-service and first-year teachers at the same institutions. Teacher knowledge and beliefs are assessed with the ESTELL Teacher Beliefs Survey (ETBS), which includes information on demographic and educational variables that could influence teacher beliefs and practices (e.g., ethnicity, language proficiency, formal science training, etc.) and a set of Likert scale items on each of the six ESTELL instructional practices. The ESTELL Dialogic Activity in Science Instruction (EDAISI) is an observational rubric that uses a set of criteria to rate a teacher's implementation of each ESTELL instructional practice on a four-point scale from Not Present to Introducing, Implementing, and then Elaborating.
3. A comparative analysis of student-teacher knowledge, beliefs, and practices in the three participating institutions (SDSU, SFSU, and SJSU).

The findings of three analyses will be presented:

1. A comparison of pre- and post-ETBS pre-service teacher scores on the six ESTELL sub-scales.
2. An analysis of the relationship between demographic characteristics and ETBS sub-scale scores.
3. An analysis of the relationship between ETBS sub-scale scores and EDAISI subscale scores.