Integrating Science And Language For All Students With A Focus On English Language Learners

Brief 2 of 7

SCIENCE AND LANGUAGE WITH ENGLISH LANGUAGE LEARNERS

Produced for the New York State Education Department by Okhee Lee, PhD

The New York State (NYS) P-12 Science Learning Standards take contemporary approaches to science learning, which are consistent with contemporary approaches to language learning. In this way, science instructional shifts and language instructional shifts are mutually supportive. As the second of the seven briefs, this brief provides an overview of science and language with English language learners (ELLs). More details about science and language instructional shifts are described in the third through fifth briefs. Details about science assessment are discussed in the final two briefs.

Science Instructional Shifts

There is broad consensus in the science education community around science instructional shifts grounded in the vision of *A Framework for K-12 Science Education* and the Next Generation Science Standards (NGSS). Based on the *Framework* and the NGSS, the NYS P-12 Science Learning Standards involve key instructional shifts from traditional approaches that focused predominantly on teaching canonical science knowledge as defined by scientists and science teachers.

Shift 1: All students *explain phenomena and design solutions to problems.* Science instruction is anchored in local phenomena and problems that draw on the everyday experiences and language of all students, including ELLs, in their homes and communities. Local phenomena and problems combine place-based learning and project-based learning. From an equity perspective, through place-based learning, students apply science and engineering to their daily lives in local contexts of home and community. ELLs bring with them a vast array of cultural and community resources that help them make sense of phenomena and solve problems. From a science perspective, through project-based learning, students integrate science disciplines as they investigate a driving question to explain a phenomenon and use engineering to design solutions to a problem.

Shift 2: All students *engage in three-dimensional learning* by blending science and engineering practices, crosscutting concepts, and disciplinary core ideas. In particular, science and engineering practices are critical for all students, especially ELLs. Because these practices are language intensive, they call for a high level of classroom discourse. ELLs can carry out sophisticated science and engineering practices, such as constructing explanations and arguing from evidence, through their emerging English.

Shift 3: All students *build their science understanding coherently* over the course of instruction. Lessons in a unit fit together and build on each other toward mastery of a targeted set of performance expectations. Over time, students develop a deeper and more sophisticated understanding of science as they make sense of phenomena. As ELLs deepen their science understanding, their language use becomes more specialized.

Language Instructional Shifts

As students "do" science, they use language. In particular, science and engineering practices are language-intensive, presenting both language opportunities and demands for ELLs.

Shift 1: ELLs learn to use multiple *modalities* strategically. Modalities refer to the multiple and varied channels through which communication occurs (e.g., talk, text, diagrams). In science and engineering, both linguistic and nonlinguistic (e.g., visual) modalities are used to engage in science and engineering practices. Thus, all students are expected to use multiple modalities in strategic ways. In ELL education, multiple modalities also support ELLs to communicate their ideas. Thus, multiple modalities are essential to engagement in science and engineering practices and particularly beneficial to ELLs.

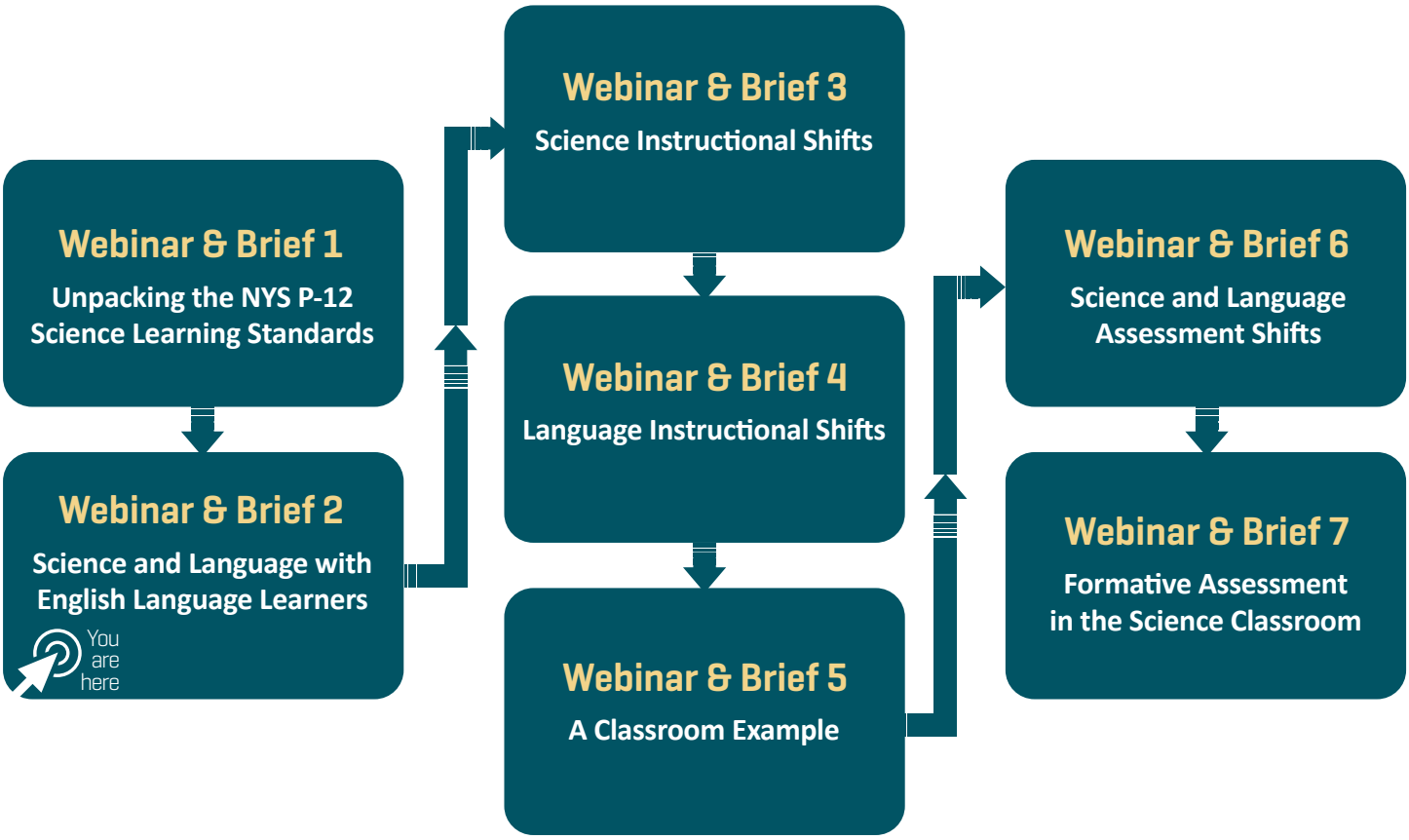
Shift 2: ELLs learn to use increasingly specialized *registers* of talk and text. Registers refer to the language used in talk and text that is associated with particular contexts of use. Registers can range from everyday to specialized. As ELLs build their science understanding over the course of instruction, their language use becomes increasingly specialized. This specialized register affords the *precision* necessary to communicate disciplinary meaning as students' science ideas become more sophisticated.

Shift 3: ELLs learn to use multiple modalities and registers to meet the communicative demands of different *interactions*. Which modalities and registers are used is determined, in part, by whether interactions are one-to-one (e.g., one student communicating with a partner), one-to-small group (e.g., one student communicating with a small group), one-to-many (e.g., one student communicating with the whole class), or small group-to-many (e.g., small groups communicating with the whole class). The specialized register affords the *explicitness* necessary (e.g., fewer deictic words like "it" and "here") to communicate disciplinary meaning across physical and temporal contexts.

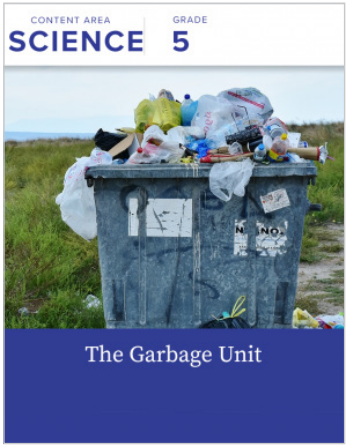
Summary

The NYS P-12 Science Learning Standards take contemporary approaches to science learning and language learning in mutually supportive ways for all students and ELLs in particular. As students make sense of a phenomenon, they engage in three-dimensional learning. Over time, they develop increasingly sophisticated understanding of science (i.e., learning progressions). As students "do" science, they use language. Initially, they draw on a range of modalities (e.g., drawings, symbols, written language) to communicate their ideas. As they build their science understanding over time, they become more strategic in using multiple modalities to represent the sophistication of their ideas. Also, students initially use a more everyday register to communicate their ideas. As they build their science understanding over time, they progress toward using a more specialized register to communicate their ideas with precision. As different types of interactions demand different degrees of explicitness, students move fluidly across modalities and registers to meet varying communicative demands.

Map of webinar and brief series on integrating science and language with ELLs



Additional Resources



Science And Integrated Language (SAIL)

NYU

Visit our research team's website and access the unit:
www.nyusail.org

NYS P-12 Science Learning Standards:
http://www.nysed.gov/curriculum-instruction/science

NYSED Office of Curriculum and Instruction:
http://www.nysed.gov/curriculum-instruction

Office of Bilingual Education and English as a New Language:
http://www.nysed.gov/bilingual-ed

Engage NY:
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