Using SIOP in Science:
Response to Settlage, Madsen, and Rustad

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It isn't unusual for an instructional model or approach to be misinterpreted in practice. Madeline Hunter bemoaned the way her Mastery Teaching approach was reduced to a seven step lesson plan. Although the Sheltered Instruction Observation Protocol (SIOP) Model of sheltered instruction for English language learners (ELLs) was developed fairly recently (Echevarria, Vogt & Short, 2000), it has already been reported implemented in unintended ways. In this space I would like to respond to the description by Settlage, Kerry, and Rustad (this issue) of their experience using the SIOP model with preservice students to teach elementary science content to ELLs.

First, let me set the context for my response. The SIOP Model is an instructional framework that incorporates best practices for teaching academic English and provides teachers with a coherent, usable approach for improving the achievement of their students. The model comprises 30 features grouped into eight components essential for making content comprehensible for English language learners—Preparation, Building Background, Comprehensible Input, Strategies, Interaction, Practice/Application, Lesson Delivery, and Review/Assessment. Arguably, these are the same kinds of instructional components that are present in effective science lessons for *all* students, and many were evident in the

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authors' description of the second grade science lesson. However, specific features of the SIOP ensure that the distinct second language development needs of ELLs are accommodated. With the SIOP Model, curricular content concepts are aligned to state standards and presented in ways that make academic content comprehensible to students. At the same time, teachers develop students' academic English language skills across the four domains—reading, writing, listening, and speaking.

The SIOP Model shares many characteristics with other models of effective instruction such as cooperative learning, strategies for reading comprehension, and differentiated instruction. However, it adds key features for the academic success of ELLs, such as the inclusion of language objectives in every content lesson, the development of background knowledge, the acquisition of content-related vocabulary, and the emphasis on academic literacy practice.

It allows for variation in classroom implementation—including inductive learning—while at the same time providing teachers with specific lesson features that, when implemented consistently and to a high degree, lead to improved academic outcomes for English language learners (Echevarria, Short & Powers, in press). As the only empirically validated approach for teaching ELLs, the SIOP Model is currently practiced in school districts and taught in university teacher preparation programs in nearly all 50 states. That level of widespread implementation is bound to result in misinterpretation and unauthorized modification of the model.

There are typically two issues that provoke questions about the SIOP Model. One involves having content and language objectives in every lesson (we don't strictly interpret a lesson as a set amount of time each day; it can extend over a couple days). For science educators in particular, it seems the sticking point about objectives is that objectives might conflict with promoting science inquiry. Settlage, Madsen and Rustad mention that the directions at the beginning of the lesson were brief, involving introduction of materials, description of the task, and description of the process by which equipment was to be distributed. These directions provide information that can become language and content objectives. For English language learners, content objectives are based on state standards but don't have to "give away" the inquiry aspect of the lesson. For this second grade lesson, the content objective might be "Students will be able to explore the properties of air." The language objective might be "Students will be able to label a diagram and read the labels." Alternatively, as long as the teacher is certain that the English learners understand the vocabulary and process necessary to participate in the lesson, the explicit discussion of objectives may follow the exploration portion of the lesson.

The second issue is that the components of SIOP are often misinterpreted as a step-by-step process. Naturally, teachers need to plan first before carrying out lessons; however, it is possible, and even recommended, that teachers review and assess knowledge at the start of the lesson and throughout, not only as the last component. The authors specifically disagree that vocabulary and objectives are presented at the beginning of lessons. In our many years of working with English learners, we have found that some context must be set and terms introduced for lessons to be meaningful and comprehensible. For ELLs, vocabulary includes process words such as *predict* and *compress* as well as terms they will need for exploration such as *syringe* and *tube*. The authors acknowledge that students were visibly frustrated when they lacked expressive vocabulary, and "when the words were supplied to them" they used them. More content specific terms may be introduced and written after the inquiry portion of the lesson. We advocate specific vocabulary instruction, and it can come where it makes the most sense. For example, in one lesson students discover fingerprint shapes. They give their own descriptive terms to the prints (e. g., circle, bean-shaped, oval) and later in the lesson the teacher introduces the scientific terms (e. g., whorl, arch). More experienced teachers know where in the lesson to teach the terms but novice teachers may benefit from structuring lessons in a particular way, especially since many teachers of ELLs are new to the profession, particularly in urban schools.

As a co-developer of the SIOP Model and longtime educator of ELLs, I am convinced that an inquiry approach is a great equalizer for scientific learning and I find the science lesson described as a wonderful opportunity for English learners to participate in learning with their peers. Just because students don't speak English doesn't mean they can't think about, be curious about, and understand scientific ideas and procedures. The only caveat is that the lesson provides enough language support so that students aren't disadvantaged by inquiry science, i. e., being lost as to what the other students are saying, writing, reading, and understanding.

The authors use language that is totally compatible with implementation of the SIOP Model, such as "identifying outcomes students are to gain from their experiences," "student-centeredness," and "appreciation of the uniqueness of each child, including his or her cultural and linguistic heritage." Since the SIOP Model explicitly promotes using students' background to make lessons relevant (Feature 7) and use of native language support for clarification of concepts and vocabulary (Feature 19), it is puzzling why the authors say it "overlooks the cultures of the subject areas, but also the cultural backgrounds of students beyond their lack of English language fluency." The model also advocates for more

interactive, less teacher-dominated instruction (Features 6, 12, 16, 17, 20, 21 and 22). The authors' depiction of a second grade lesson describes a setting that reflects a common SIOP lesson setting: "Classroom furniture was arranged into hexagonal tables with three to five students in each group. Each student had their own equipment and any cooperative learning that occurred were spontaneous collaborations as students shared their ideas with whomever they chose." The text, *Making Content Comprehensible for English Language Learners: The SIOP Model, Second Edition*, fully elaborates the features of the SIOP Model with examples of actual lessons.

I applaud the authors for their interest in making the study of science relevant to culturally and linguistically diverse students. The growing numbers of English language learners in our schools dictate that educators focus their energies on providing improved instruction for all students regardless of their cultural and linguistic background. Our research has shown that the framework the SIOP Model provides does just that.

References

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