

English Language Learners in the Math Classroom



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Research studies have demonstrated that English Language Learners (ELLs) generally pick up everyday conversational fluency within a year or two of starting to learn English. However, a much longer period (generally at least five years) is required for students to fully catch up to native speakers in academic language proficiency (e.g., vocabulary knowledge, reading and writing skills). In mathematics, ELL students often make good progress in acquiring basic computation skills in the early grades; however, they typically experience greater difficulty in carrying out word problems particularly as these problems become more complex linguistically in later grades.

Thus, ELL students are likely to require explicit *language* support within the classroom in order to achieve content standards in subject areas such as mathematics. Despite the fact that they have acquired conversational fluency in English together with basic mathematical vocabulary and computational skills, students may still experience gaps in their knowledge of more sophisticated vocabulary, syntax, and discourse features of mathematical language.

The linguistic challenges faced by ELL students in learning math reflect the fact that language is central to the teaching of virtually every school subject. The concepts embedded in the curriculum are inseparable from the language we use to teach these concepts to our students. For example, most mathematical problems require students to understand prepositions and logical relations that are expressed through language.

This fusion of language and content across the curriculum presents both challenges and opportunities in teaching ELL students. The challenges are to provide the instructional supports to enable ELL students to understand math content and carry out math tasks and operations. However, math instruction also provides teachers with the opportunity to extend ELL students' knowledge of language in ways that will significantly benefit their overall academic development. For example, as they learn mathematics, students are also learning that there are predictable patterns in how we form the abstract nouns that describe mathematical operations. Many of these nouns are formed by adding the suffix *-tion* to the verb, as in *add/addition*, *subtract/subtraction*, *multiply/multiplication*, etc. This knowledge can then be applied in other subject areas across the curriculum (e.g., science, language arts).

In building ELL supports for *Investigations*, we have been guided by *The Pearson ELL Curriculum Framework*, which incorporates the following five instructional principles central to teaching ELL students effectively.

1. Identify and Communicate Content and Language Objectives In planning and organizing a lesson, teachers must first identify what content and language objectives they want to communicate to students. The language objectives might include providing definitions, descriptions, examples, and visual supports for explaining vocabulary.

2. Frontload the Lesson Frontloading refers to the use of prereading or preinstructional strategies that prepare ELL students to understand new academic content. Frontloading strategies include activating prior knowledge, building background, previewing text, preteaching vocabulary, and making connections.

3. Provide Comprehensible Input Language and content that students can understand is referred to as comprehensible input. Teachers make use of nonlinguistic supports to enable students to understand language and content that would otherwise have been beyond their comprehension. Typical supports include visuals, models, and manipulatives.

4. Enable Language Production Language production complements comprehensible input and is an essential element in developing expertise in academic language. Use of both oral and written language enables students to solve problems, generate insights, express their ideas, and obtain feedback from teachers and peers.

5. Assess for Content and Language Understanding Finally, the instructional cycle flows into assessing what students have learned and then spirals upward into further development of students' content knowledge and language expertise.

These principles come to life in the *Differentiation and Intervention Guide* in the form of seven specific instructional strategies.

- **Model Thinking Aloud** When ELL students articulate their thinking processes through language, they are enabled to complete activities, identify gaps in their knowledge, and receive feedback from teachers. Teachers, however, must model this process in order for students to learn how to use it effectively. When modeling thinking aloud, it is important for teachers to use visuals and gestures.
- **Partner Talk** When it comes to working on a math activity of any kind, two heads are often better than one. Partner talk provides an audience for students' thinking aloud and an opportunity for the teacher to direct students to listen for particular vocabulary and linguistic structures as they engage in a task with their partner.

- **Provide a Word List** When students make a list of relevant vocabulary in a lesson with examples of how these words are used, it reinforces their knowledge of this vocabulary and provides an opportunity for teachers to monitor their understanding and provide additional explanation as needed. Paying special attention to homophones, such as *sum* and *some*, is particularly helpful for ELL students.
- **Provide Sentence Stems** Sentence stems provide support for ELL students to gain access to the sequence of steps in an activity, and they expand students' knowledge of how to communicate their thinking processes to the teacher and their peers.
- **Rephrase** Students struggling with vocabulary and language acquisition are often confused by extra details in word problems or overly wordy statements. Rephrasing statements in a different way that utilizes simpler language, shorter sentences, and eliminates unnecessary information helps students focus on and understand the important information needed to work through an activity.
- **Suggest a Sequence** Sequencing of steps is crucial to solving many math problems, and ELL students may need additional help in this process. Providing struggling ELL students with a sequence of steps to follow provides them with a guide for how to complete an activity or report their findings. When suggesting a sequence, be sure to use concise language.
- **Use Repetition** Repetition of instructions or explanations may also be required to enable ELL students to fully understand instruction. Because students are still in the process of learning English, they may need repetition, paraphrasing, or elaboration to understand teacher talk containing new vocabulary or structures.