Walch Education *CCSS Integrated Pathway Mathematics I, II, and III*

Research-Based Strategies to Support English Language Learners

**Overview**
The *CCSS Integrated Pathway Math I, II, and III* resources, comprising the Teacher Resource (TR), Student Resource Book (SRB), Student Workbook (SWB), and digital enhancements, include multiple strategies for supporting English Language Learners (ELLs) in the mathematics classroom. The following summary illuminates research findings and relevant program features that address the needs of ELLs.

**Math as a Foundation for ELL Success**
A strong mathematics program that supports ELL students in pursuing rigorous mathematics learning objectives benefits both language acquisition and long-term academic success. Walch’s resources support the inclusion of ELLs in high school mathematics classes via the program attributes described below, allowing these students to engage in challenging math content.

- “… high-quality instruction for ELLs that supports student achievement has … an emphasis on academic achievement, not only on learning English” (Moschkovich, 2012).

**Developing Language with Mathematical Inquiry**
Several attributes of the Walch IP programs, particularly the problem-based instructional model and Station Activities, provide all students with a variety of opportunities to immerse themselves in written and spoken English, as well as to develop essential problem-solving skills such as risk-taking and constructing meaning.

- Curricula should provide “abundant and diverse opportunities for speaking, listening, reading, and writing” and instruction should “encourage students to take risks, construct meaning, and seek reinterpretations of knowledge within compatible social contexts” (Garcia and Gonzalez, 1995).

**Supporting ELL Through Real-World Connections**
A central feature of Walch’s CCSS Integrated Pathway programs is our focus on real-world problems, used in many of the Warm-Ups, Guided Practice examples, Practice sets, and Station Activities, as well as in all of the Problem-Based Tasks.

Interpreting and strategizing about problems set in familiar, relevant contexts allows students to describe their thinking without relying exclusively on mathematical terminology, and to demonstrate achievement through successful problem solving rather than through vocabulary tests. By applying mathematics in meaningful situations, students can grapple with the complexity of the relevant language without being overwhelmed. Furthermore, they can use a variety of mathematical representations (e.g., graphs, table, charts, and diagrams) to help them make sense of the math and of the language. Finally, setting problems in recognizable circumstances lets students employ
both English and their home languages as tools to interpret and make sense of the content.

- **Principle 1**: Focus on students’ mathematical reasoning, not accuracy in using language.
- **Principle 2**: Focus on mathematical practices, not language as single words or definitions.
- **Principle 3**: Recognize the complexity of language in mathematics classrooms and support students in engaging in this complexity.
- **Principle 4**: Treat everyday and home languages as resources, not obstacles.

*Principles for Mathematics Instruction for ELLs* (Moschkovich, 2012)

**Scaffolding in Guided Practice**
The scaffolding in Walch’s Guided Practice problems provides ELLs with step-by-step methods for solving problems. In these worked examples, students are led through the steps to the solution to help them understand the relevant information and procedures used to solve each problem. The Student Workbook offers the opportunity for students to work through each example themselves, and to record the steps in their notes for easy reference. The Guided Practice Example procedures are fully articulated in the Student Resource Book, which students can consult when completing homework assignments or studying for tests.

- “… support students in learning to approach a mathematics problem” and give them “tools for learning to read, understand, and extract relevant information from a problem” (ELL Stanford, 2013).

**Scaffolding in Problem-Based Tasks**
The Coaching Questions for the Problem-Based Tasks in each sub-lesson reflect the use of scaffolded questions to help student read and interpret math problems. The Coaching Questions also provide opportunities to speak, write, read, and listen in mathematics classes, and offer students a strategy to break down the content of the Problem-Based Task. This scaffolding helps students approach and interpret the Task, which supports them in taking risks, constructing meaning, and seeking reinterpretations of knowledge.

Problem-Based Tasks provide multiple avenues for differentiation. Teachers can use Coaching Questions as verbal prompts, thereby leading and encouraging ELL students. Or, the Tasks can be completed in small groups, with the teacher or a student reading the questions and students discussing their answers. This encourages interaction amongst students, allowing students to model their approaches for one another. Alternatively, ELLs may be asked to respond to the Coaching Questions as a reading and writing activity completed independently.
• “It is important for all students, but especially critical for ELLs, to have opportunities to speak, write, read, and listen in mathematics classes, with teachers providing appropriate linguistic support and encouragement” (NCTM, 2013).

Station Activities/Debriefing
Station Activities provide students a chance to practice and apply the mathematical skills and concepts they are learning. Station Activities are designed for small-group work so that ELLs can collaborate with their classmates and, consequently, develop and refine their language skills.

The Station Activity debrief provides another opportunity for students to speak, write, read, and listen. As suggested in directions to the teacher, the debrief is conducted as a “think-pair-share” oral activity. In this manner, ELL students are able to practice their listening and speaking skills. If implemented as a paper assignment, students are given the opportunity to practice their reading and writing skills. Regardless of the debrief approach, students are able to reflect on their experiences and synthesize their thinking, developing their language skills in the process.

• "Instruction should provide opportunities for students to actively use mathematical language to communicate about and negotiate meaning for mathematical situations" (Moschkovich, 2012).

Graphic Organizers
The Program Overview for each Walch mathematics course contains a large number of graphic organizers for both teacher and student use. Graphic Organizers provide ELL students with a means of organizing, categorizing, and describing vocabulary and relationships, which builds mathematical understanding.

• “Instruction should … draw on multiple resources available in classrooms (objects, drawings, graphs, and gestures)” (Moschkovich, 2012).

Addressing Cultural and Linguistic Heritage
Walch materials strive to value and applaud cultural diversity through the thoughtful use of multicultural names and varied problem contexts. These serve to affirm individuals’ experiences and to enrich everyone’s awareness.

• “Every student’s cultural and linguistic heritage should be respected and celebrated for the diversity that it contributes to the learning environment” (NCTM, 2013).

English/Spanish Glossaries
The TR, SRB, and SWB contain bilingual glossaries in Spanish and English to assist students who are learning English. The Spanish glossary can be used when additional clarification of a term is needed or to confirm understanding of a word. This helps to minimize language as a barrier to mathematics learning.
For more information about Walch’s CCSS Integrated Pathway Mathematics programs and the research that supports them, please contact Jill Rosenblum, Vice President of Education, at jrosenblum@walch.com.

References/Additional Resources