

Walch Education *CCSS Integrated Pathway: Mathematics I, II, and III* Research-Based Strategies

Introduction

In designing and developing the *CCSS Integrated Pathway: Mathematics I, II, and III* resources, Walch's team drew on the research base for best practices in instruction. Throughout the program's components, including the Teacher Resource, Student Resource Book, Student Workbook, and digital enhancements, the materials reflect that research and employ those strategies. The following summary illuminates the specific program features and research findings that support the importance of these materials and their efficacy.

Truly Aligned Content

Walch's *CCSS Integrated Pathway: Mathematics I, II, and III* programs are purpose-built to reflect the specific unit structure of each course and address each of the standards for the Integrated Pathway in Appendix A of the Common Core State Standards.

- Alignment of instruction links the content of state standards with what is actually taught in the classroom (English, 1980; Blank, Porter, and Smithson, 2001).
- "In order for students to become proficient on state standards, cognitive demand and classroom content must align to standards and assessments" (Bhola, Impara, and Buchendahl, 2003).

Options for Differentiation

The programs employ varied instructional models, multiple examples, and extra practice so that teachers can mix and match to meet the needs of individual students.

- "Teaching any student well means striving to understand how that student approaches learning and creating an environment that is respectful of and responsive to what each student brings to the classroom" (Tomlinson and Javius, 2012).
- "Teachers should talk with their students about preferred approaches to learning and offer varied routes to accomplishing required goals. Teachers should select instructional strategies and approaches in response to what they know of their students' interests and learning preferences, rather than beginning with a strategy and hoping it works" (Tomlinson and Javius, 2012).

Warm-Up Problems

Activities at the beginning of each sub-lesson address prerequisite skills or previously taught math concepts to engage students in learning.

- "Warm-up exercises help activate prior knowledge and misconceptions, reinforce what is learned in class, and increase active learning" (Marss, Blake, and Gavrin, 2003).

Words to Know

Vocabulary terms are provided in both the teacher and student materials to highlight key concepts that are addressed in the lesson.

- “Teaching vocabulary should be an instructional goal for teachers in all content areas, including math” (Harmon, Wood, and Kiser, 2009).

Contextualized Guided Practice with Applets

In the enhanced teacher resources, digital applets reflective of the guided practice examples provide an interactive, web-based mechanism for students to explore and visualize the concepts that they are learning in class.

- “Virtual manipulatives ... may be very effective supplements to a teacher’s methods of instruction” (Moyer, 2002).

Problem-Based Tasks with Coaching Questions

Each sub-lesson includes a problem-based task, providing an opportunity for application and connecting the specific mathematics to real-world situations.

- Learning a subject or skill without context “often leaves students with a disconnected view of knowledge and fails to reflect the way that real people attack real problems in the real world” (Daniels and Bizar, 1998).
- “Students in problem-based learning environments typically have greater opportunity to learn mathematical processes associated with communication, representation, modeling, and reasoning” (Smith, 1998; Erickson, 1999; Lubienski, 1999).

Station Activities

Each unit includes a collection of station activities with four or more stations that explore the targeted concepts from different perspectives and employ manipulatives. Station activities provide differentiated options for learning that include collaborative grouping and kinesthetic learning.

- “Classes should include students of diverse needs, achievement levels, interests, and learning styles, and instruction should be differentiated to take advantage of the diversity, not ignore it” (Jackson and Davis, 2000).
- Peer-assisted learning is highly beneficial for lower-performing math students (National Council of Teachers of Mathematics, 2007).
- “Research indicates that lessons using manipulative materials have a higher probability of producing greater mathematical achievement than do lessons without such materials” (Sowell, 1989; Suydam and Higgins, 1977).

Student Workbooks with Scaffolded Practice

Each sub-lesson in the student workbook includes a guided practice problem with step-by-step prompts, followed by additional guided practice problems for students to work through on their own.

- “Scaffolding is the support given during the learning process which is tailored to the needs of the student with the intention of helping the student achieve his/her learning goals and promote a deeper level of learning” (Sawyer, 2006).

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.