



CCGPS Coordinate Algebra Research Base for Instructional Approaches

Introduction

In designing and developing CCGPS Coordinate Algebra resources for Georgia, 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, and digital enhancements, the materials reflect that research and employ those strategies. Below, please find a summary of the specific program features and research findings that support their importance and efficacy.

Truly Aligned Content

Coordinate Algebra was purpose-built using the Georgia frameworks and CCGPS curriculum map.

- "Alignment of instruction links the content of state standards with what is actually taught in the classroom" (English, 1980; Blank, Porter, & 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, & Buchendahl, 2003).

Options for Differentiation

The program employs 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 & Javrus, 2012, p. 29).
- "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 & Javrus, 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, & Gavrin, 2003).

Words to Know

Vocabulary terms are provided in both 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, & Kiser, 2009).

Contextualized Guided Practice with Applets

Digital Applets included with Guided Practice examples provide an interactive mechanism for students to explore and visualize the concepts that they are learning in class.

- “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 & Higgins, 1977).
- “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 of 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 & 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).

Coaching Questions provide scaffolding for students who need extra guidance with problem solving.

- “Planning for instruction should take into account what students know, and instruction should provide ways of ascertaining what students know and think as well as their interests and needs” (*Adding it Up*, 2001, p. 425).

Station Activities

Each unit includes a collection of station activities with four or more stations that explore the targeted concepts from different perspectives. Stations 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 & Davis, 2000, p. 23).
- “Peer-assisted learning is highly beneficial for lower performing math students” (NCTM, 2007).

For more information about Walch’s CCGPS Coordinate Algebra Program and the research that supports it, please contact Rebecca Johnson, Ed.S, Regional Manager for Georgia, at (800) 558-2846, ext. 2562; (678) 552-3594; or at rjohnson@walch.com.