Cognitive Tutor Intervention Information

Description of Intervention	
Basic Focus	first-year Algebra course
Intended Student Groups	first-year Algebra course students
Intended Instructors	any
Cost	A subscription to Carnegie Learning Adaptive Math Solutions includes the following: • Student License for the Cognitive Tutor software • Access to Carnegie Learning Teacher's Toolkit. The website suggests that people interested in the product request to speak with a Carnegie Learning Regional Account Manager regarding purchasing options at 888.851.7094.
Implementation	
Structure of Intervention	**No detailed studies/analyses of implementation found** **Carnegie Learning Software Overview:** *from http://www.carnegielearning.com/software_features.cfm* The Cognitive Tutor software was developed around an artificial intelligence model that identifies weaknesses in each individual student's mastery of mathematical concepts. It then customizes prompts to focus on areas where the student is struggling, and sends the student to new problems that address those specific concepts. *Pedagogy* • Engages students directly in problem solving. • Uses concrete, real-world scenarios. • Makes use of informal student knowledge. • Prompts a student to think abstractly, by converting situations into quantities and units. *Multiple Representations* • Students work with multiple representations of a problem. • The Solver encourages students to express the problem numerically. • The Grapher displays the problem graphically in a coordinate plane. • The Worksheet prompts students to convert word problems to mathematical expressions. *Interactive Examples* • Delivers on screen, step by step instruction for each software unit *Flexible Sequencing* • Gives administrators the ability to build a custom curriculum to meet the special needs of districts or schools. • Units can be re-ordered, added and deleted, and new sequences can be named and published for use in the classroom. *Automated Assessment* • Delivers pre- and post-tests that automatically tie to custom-sequenced curricula.

• The pretest may be configured to be diagnostic, in which case results are used to set pacing for students in the instructional software.

Just-in-time Feedback
• Hints are contextual and oriented towards helping the student to solve key steps in the problem.
• Immediate feedback enables the student to self-correct.
• The program recognizes the most common student errors and responds appropriately.

Skillometer
• As a student becomes more proficient in a skill, the bars on the Skillometer increase in length and turn gold, indicating mastery.
• Teachers can view an immediate snapshot of each student's progress.

The Teacher's Toolkit
The Teacher's Toolkit provides an interface for performing administrative tasks associated with the Cognitive Tutor software. Such tasks typically include: Adding and deleting instructors; Creating new class rosters; Tracking student progress; Printing class summaries and individual student reports; Maintaining class rosters (changing student names, transferring and removing students); Restarting and skipping problems; Changing a student's placement within the curriculum; Deleting class rosters

Reports
Teacher's Toolkit Reports cover a variety of information including time spent in lessons, number of problems completed, etc. Each task listed under Reports on the task panel provides a different view of student data.

Assessments
Automated assessments deliver pre- and post-tests that automatically tie to custom-sequenced curricula. The pre-test diagnostically determines areas of student strength and weakness, and can optionally be configured to prescribe more work through the curriculum in areas of weakness. The assessments also produce multiple variants of selected problems, so different students receive the same content, but with different problems.

Student Text Features:
Collaborative Learning Focus
Throughout the text, icons emphasize the collaborative learning instruction model. Students are directed to Discuss to Understand, Think for Yourself, Work with Your Partner, Work with Your Group, or Share with the Class.

Mathematics Communication
Students are encouraged to communicate with directions in the text

	such as, "Explain how you solved the problem to your partner," and "Share what your group discovered with the entire class." *Lesson Layout* Each lesson begins with a list of Objectives and Key Terms. Students complete Problems based on real life situations to which they can relate. Occasional margin notes, called Take Note, remind students of information they have already learned or call attention to common ideas or common errors.
Teacher Professional Development	**Carnegie Learning Professional Development program:** STEP 1 Initial Three Day Professional Development Programs: Pre-implementation STEP 2 Implementation Fidelity Day: Carnegie Learning's Managers of School Partnerships will visit schools and classrooms for one-on-one conversations and group discussions about how teachers are implementing the product. STEP 3 Customized Ongoing Professional Development Workshops: It is recommended to schedule workshops following Implementation Fidelity days so the specific needs of the teachers can be addressed. Carnegie Learning also offers Content Academies to strengthen teachers' mathematical understanding. Cognitive Tutor textbooks are accompanied by a Teacher's implementation guide that includes a smaller version of each Student Text page. The Exploring Together section in the margin suggests a Grouping that will work for the lesson, problem-specific Guiding Questions for the teacher to pose, and Key Formative Assessment Questions that allow the teacher to ensure that groups or individuals are on track. Notes about particular questions may include suggestions for key actions on the part of the teacher, hints about pitfalls in a particular problem, and information about alternative solution paths. Answers are given in place for all questions, including sample answers to writing questions. Standard implementation of the blended math curricula involves three days of collaborative learning in the classroom and two days learning with Cognitive Tutor technology.
Website	http://www.carnegielearning.com/

Research	
Outcome Studies	*Arbuckle, William J. (2005) Conceptual understanding in a computer-assisted Algebra 1 classroom. Ph.D. dissertation, The University of Oklahoma, United States -- Oklahoma. Retrieved November 24, 2008, from Dissertations & Theses: Full Text database. (Publication No. AAT 3203318). **Carnegie Learning, Inc. (2001, September). *Report of Results from Canton, Ohio* (Cognitive Tutor Research Report OH-01-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from Denver, CO* (Cognitive Tutor Research Report CO-00-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from El Paso, Texas* (Cognitive Tutor Research Report TX-00-03). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from Lewisville, TX* (Cognitive Tutor Research Report TX-00-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from Milwaukee, Wisconsin* (Cognitive Tutor Research Report WI-97-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> ** Carnegie Learning, Inc. (2001, September). *Report of Results from Pittsburgh, Pennsylvania* (Cognitive Tutor Research Report PA-95-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> ** Carnegie Learning, Inc. (2001, September). *Report of Results from Pittsburgh, Pennsylvania* (Cognitive Tutor Research Report PA-94-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from San Francisco Unified School District's summer school 2000* (Cognitive Tutor Research Report CA-00-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2001, September). *Results from The Colony, TX* (Cognitive Tutor Research Report TX-00-02). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm> **Carnegie Learning, Inc. (2002, May). *Results from Moore, OK* (Cognitive Tutor Research Report OK-01-01). Pittsburgh, PA. Retrieved November 25, 2008 from <http://www.carnegielearning.com/approach_research_reports.cfm>

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Research on Implementation and Outcomes	*Plano, Gary S. (2004) The effects of the Cognitive Tutor Algebra on student attitudes and achievement in a 9th-grade algebra course. Ed.D. dissertation, Seton Hall University, College of Education and Human Services, United States -- New Jersey. Retrieved November 24, 2008, from Dissertations & Theses: Full Text database. (Publication No. AAT 3130130). *Morgan, P., & Ritter, S. (2002). An experimental study of the effects of Cognitive Tutor Algebra I on student knowledge and attitude (Available from Carnegie Learning, Inc., 1200 Penn Avenue, Suite 150, Pittsburgh, PA 15222). Retrieved November 24, 2008, from <http://www.carnegielearning.com> Shneyderman, A. (2001) *Evaluation of the Cognitive Tutor Algebra 1 Program.* Unpublished manuscript. (Miami-Dade County Public Schools Office of Evaluation and Research, 1500 Biscayne Boulevard, Miami, FL 33132) *Koedinger, K.R., Anderson, J.R., Hadley, W.H., & Mark, M.A. (1995) Intelligent tutoring goes to school in the big city. *International Journal of Artificial Intelligence in Education 8,* 30-43.
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