

Concrete-Representational-Abstract (CRA) Instructional Approach

CRA is an intervention for mathematics instruction that research suggests can enhance the mathematics performance of students with learning disabilities. It is a three-part instructional strategy, with each part building on the previous instruction to promote student learning and retention and to address conceptual knowledge.

The CRA instructional sequence consists of three stages: concrete, representation, and abstract:

- *Concrete.* In the concrete stage, the teacher begins instruction by modeling each mathematical concept with concrete materials (e.g., red and yellow chips, cubes, base-ten blocks, pattern blocks, fraction bars, and geometric figures).
- *Representational.* In this stage, the teacher transforms the concrete model into a representational (semiconcrete) level, which may involve drawing pictures; using circles, dots, and tallies; or using stamps to imprint pictures for counting.
- *Abstract.* At this stage, the teacher models the mathematics concept at a symbolic level, using only numbers, notation, and mathematical symbols to represent the number of circles or groups of circles. The teacher uses operation symbols (+, −, ×, ÷) to indicate addition, multiplication, or division.

Guidelines for Using Manipulatives With Students With Disabilities

- Select manipulatives that are connected to the concept and to students' developmental level.
- Incorporate a variety of manipulatives for concept exploration and attainment.
- Provide verbal explanations and questions with demonstrations.
- Provide opportunities for student interaction and explanation.
- Encourage the use of manipulatives and strategies across settings.
- Program for transition from concrete to symbolic representation.

Maccini, P. & Gagnon, J. A. (2000, January). Best practices for teaching mathematics to secondary students with special needs. *Focus on Exceptional Children*, 32(5), 11.

Resources:

<http://www.coedu.usf.edu/main/departments/sped/mathvids/index.html> This Web site provides instructional strategies in three categories: Teacher Instruction, Student Practice, and Evaluation. These strategies were chosen on the basis of learning research on students who are at risk of academic failure and students who are identified with learning problems, research on effective mathematics instruction for students with and without learning problems, and suggestions from an advisory committee made up of elementary and special education teachers

Math Recovery (AVMR) Uses this instructional approach for all of its lessons.

Basic Skills Scaffolding CRA Model

Students use a pocket-size facts chart in order to proceed to more complex computation, applications, and problem-solving. As the students demonstrate speed and reliability in knowing a number fact, it can be removed from a personal chart. Addition and multiplication charts also can be used for subtraction and division respectively. For specific use as a basic fact reference, a portable chart (back-pocket-size, for older students) is preferable to an electronic calculator. Having the full set of answers in view is valuable, as is finding the same answer in the same location each time since where something is can help in recalling what it is. Also, by blackening over each fact that has been mastered, overreliance on the chart is discouraged and motivation to learn another one is increased. For those students who have difficulty locating answers at the vertical/horizontal intersections, it helps to use cutout cardboard in a backward L-shape.

CRA Tool Resources

Hands on Equations

Algebra Tiles