



Using CRA (Concrete-to-Representable-to-Abstract) to Teach Algebra Lesson 2: Representational

Objective: To teach students to the skills to solve complex algebraic expressions using representational/pictorial instruction within the CRA model.

Setting and Materials:

Settings: Inclusion Classroom (General education classroom: 50 minute math/Algebra class)

Materials:

- Paper
- Pencil
- Pictures of the steps for solving the problem

Content Taught

Teach the skills needed to solve Algebraic expressions using representational/pictorial instruction.

Teaching Procedures

1. Introduce the lesson on the topic of solving algebraic expressions.
2. Model the lesson:
 - a) Step 1: Show the students how to draw or represent the concrete examples for the expression in order to simplify.
 - b) Example: $-5n - 2/x + n - 12$
 - c) Teach the students to draw the representations of the concrete items they used in lesson 1. (e.g. cups, toothpicks, etc.)
 - d) In the example $-5n - 2/x + n - 12$: Students would represent the “-“ by drawing a minus sign.
 - e) To represent $2/x$ students would draw two toothpicks over an x.
 - f) To represent the + n, students would draw the plus, a cup and an n.
 - g) To represent a minus and a 12, students will draw a minus sign and use sticks to represent 12. Since 12 is 10 and two ones. That would be drawn using one long line to represent 10 and two small lines to represent the ones.
3. Guide students through procedures:
 - a) Give the students a problem to solve using the representational method to solve. (i.e. $-5n - 2/x + n - 12$)
 - b) Together go through the problem.

- c) Guide the student through additional practice problems using the symbols.
1. $-5n - 2/x + n - 12$ (combine $-5n$ and $+n$)
 2. $-4n - 2/x - 12$

4. Independent Practice:

- a) Give the students problems for independent practice.
- b) If the students get fewer than 5 correct, give more guided practice.
- c) After guided practice, give students more problems for independent practice.
- d) If a student still gets less than 5 correct, repeat the lesson for that student.

Evaluation

Independent practice problems were used to assess the students learning.

Lesson Plan Based on:

Cease-Cook, J.J. (2013). The effects of concrete-representational-abstract sequence of instruction on solving equations using inverse operations with high school students with mild intellectual disability. (Unpublished doctoral dissertation). University of North Carolina at Charlotte, Charlotte, NC.

Witzel, B. S. (2005). Using cra to teach algebra to students with math difficulties in inclusive settings. *Learning Disabilities: A Contemporary Journal*, 3(2), 49-60

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