

TOOLS FOR PARA EDUCATORS TEACHING MATH

Concrete-Representational-Abstract
Instructional Approach

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INTERVENTION RECOMMENDATIONS

- Explicit
- Systematic
- Provide models
- Include word problems
- Visual representation
 - Concrete
 - Representational
 - Abstract

EXPLICIT

- Provide clear models
- Extensive practice
- Opportunities to think aloud
- Extensive feedback
- Include scaffolding

SYSTEMATIC

- Gradually builds proficiency
- Introduces concepts in a logical order
- Numerous applications

MODELS

- Structure
- Step by step
- Think aloud
- Varies
 - Content
 - Student knowledge

WORD PROBLEMS

- Teach the structure of problem types, how to categorize problems, and how to determine appropriate solutions
- Teach the students to recognize the structure and transfer from familiar to unfamiliar



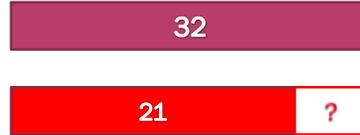
CHANGE

- Brad has a bottlecap collection. After Sam gave Brad 7 more bottle caps, Brad had 11 bottle caps. How many bottle caps did Brad have before Sam gave him more?



COMPARE

- There are 21 fish and 32 birds at the pet store. How many more birds are at the pet store than fish?



SORT THE BOX

- On your table there is a box of various tools and examples, using your background experience work with your table to sort this box into 3 logical categories

VISUAL REPRESENTATION

- Concrete-representational-abstract (CRA) instructional approach
 - CONCRETE- "doing" stage
 - REPRESENTATIONAL- "seeing" stage
 - ABSTRACT- "symbolic" stage

CONCRETE - "OBJECTS"

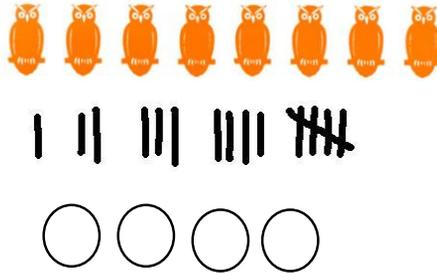


- In concrete stage the instructor models each math concept using concrete materials:
 - Chips
 - Cubes
 - Base ten blocks
 - Pattern blocks
 - Fraction bars
 - Geometric figures
 - Straws
- Utilizes visual, tactile and kinesthetic experiences to establish understanding

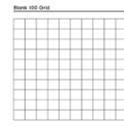
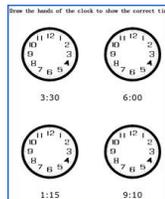
GUIDELINES FOR USING MANIPULATIVES

- Chose manipulatives that are connected to the concept and the students ability level
- Use a variety of manipulatives
- Provide verbal explanations, demonstrations, and answer questions
- Provide opportunities for students to interact
- Encourage use across settings

REPRESENTATIONAL- "DRAWINGS"



- In the representational stage the instructor models how to transform a concrete model into a representational model
 - Drawing pictures
 - Circles
 - Dots
 - Tallies
 - Stamps



ABSTRACT- "EQUATIONS & NUMBERS"



USING TALLIES.....

- Complete the following problem

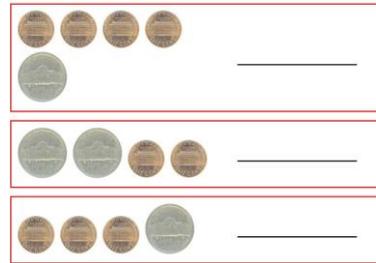
134
 X 8

MULTIPLY

$34 \times 8 = 272$
 $634 \times 5 = \square$
 $220 \times 5 = \square$
 $683 \times 3 = \square$

- In this stage the instructor models the math concept at a symbolic level
 - Numbers
 - Notation
 - Symbols
- Students need to have a model to follow for how to move from representational to abstract so it should be a planned part of the student's programming

How much money is there? Write down on the line.



ALGEBRA

- Can you use this CRA instructional model to teach a student algebra or geometry?
 - 2X
 - $4a \times 3 = 15$
- 3 dimensional shapes
- Lines of symmetry
- Translation, reflection, rotation
- Vertices, etc.

QUESTIONS....

REFERENCES

- Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). *Assisting students struggling with mathematics: Response to Intervention (RTI) for elementary and middle schools (NCEE 2009-4060)*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>
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