

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



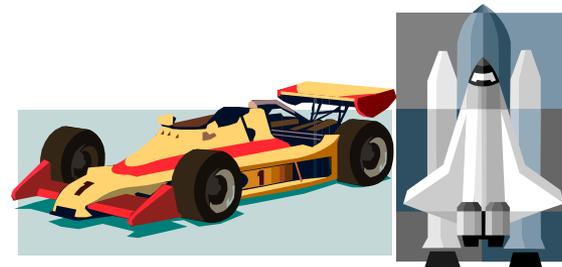
MODELS

- 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 bottlecaps. How many bottlecaps 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?

32

21

?

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”



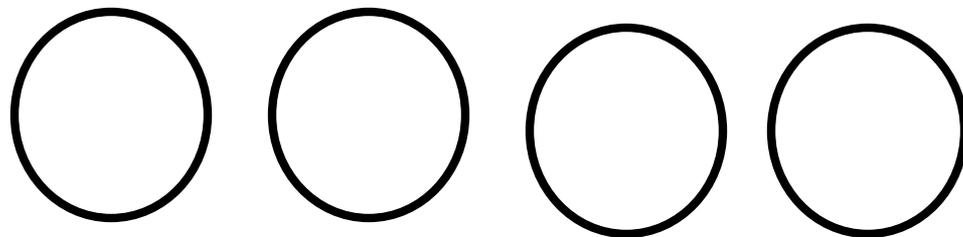
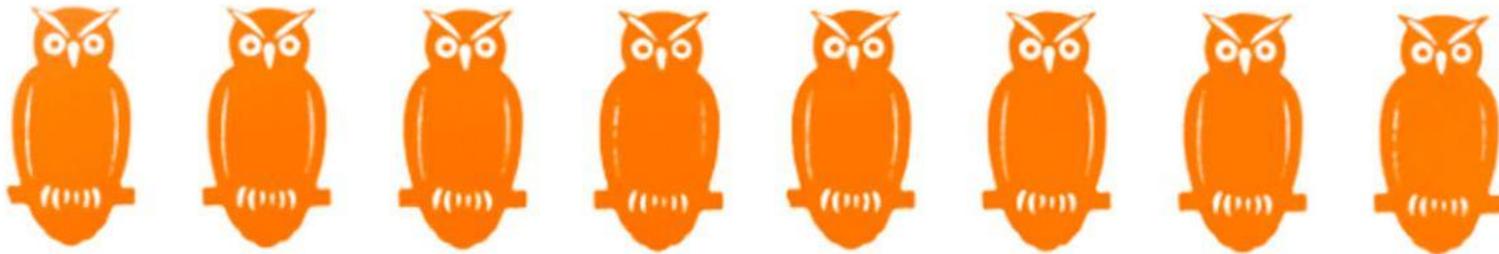
- In concrete stage the instructor models each math concept using concrete materials:
 - Chips
 - Cubes
 - Base ten blocks
 - Pattern blocks
 - Fraction bars
 - Geometric figures
 - Straws
- Utilizes visual, tactile and kinesthetic experiences to establish understanding

GUIDELINES FOR USING MANIPULATIVES

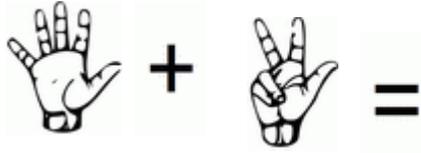
- ◉ Chose manipulatives that are connected to the concept and the students ability level
- ◉ Use a variety of manipulatives
- ◉ Provide verbal explanations, demonstrations, and answer questions
- ◉ Provide opportunities for students to interact
- ◉ Encourage use across settings

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



Draw the hands of the clock to show the correct time.



3:30



6:00

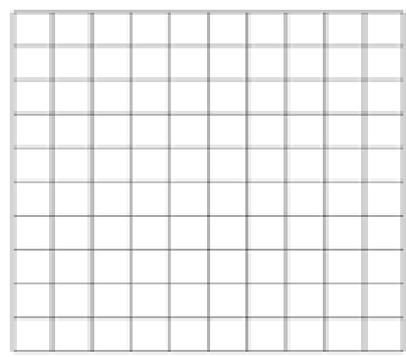


1:15



9:10

Blank 100 Grid



ABSTRACT-

“EQUATIONS & NUMBERS”



USING TALLIES.....

- Complete the following problem

$$\begin{array}{r} 134 \\ \times 8 \\ \hline \end{array}$$

MULTIPL

$134 \times 8 = \boxed{?}$

$834 \times 5 = \boxed{}$

$$220 \times 5 = \boxed{}$$

$$683 \times 3 = \boxed{}$$

- 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.



Four pennies and one nickel are shown in a row. To the right of the coins is a horizontal line for writing the total value.



Two nickels and two pennies are shown in a row. To the right of the coins is a horizontal line for writing the total value.



Three pennies and one nickel are shown in a row. To the right of the coins is a horizontal line for writing the total value.

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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