



Using Self-Regulated Strategy Instruction to Solve Multiple Step Equations

Objective: To teach students how to solve and check multiple step math equations.

Setting and Materials:

Settings: Resource Classroom (Special education classroom: 45 minute middle school math class)

Materials:

- Student contract that go over expectations
- Individual worksheets
- Mnemonic worksheet with pictures that go with the mnemonic and a checklist
- Self-Monitoring sheet to self-evaluate themselves
- Self-statement sheet used for student to develop positive statement or reminder to think and say when solving equations.

Content Taught

Teach students the skills needed to solve multiple step equations including the following operations (a) addition, (b) subtraction, (c) multiplication, and (d) division, as well as, how to check their work for errors.

Teaching Procedures

1. Develop background knowledge
 - a) Introduce the SOLVE It! Strategy
 - b) Have students sign learning contracts
 - c) Discuss the background knowledge of solving equations (review)
 - d) Review key terms associated with solving multiple step equations (i.e., distributive property, combining like terms, variables, and inverse operations).
 - e) Show and explain the key terms and then have the students practice identifying the terms. (e.g., Show an example of when to distribute, and then have students practice identifying equations that included the distributive property).
2. Discuss and explain the mnemonic Don't Catch My Cat Whisker
 - a) **Don't**-The distributive property
 - b) **Catch**- Combine like terms (Catch is broken down into two specific steps)
 - 1) **Pick the vine and never trip:** means "putting the variables and numbers together."

- 2) **Ultimately intelligent oranges impress old shoes:** means “ use inverse operations when on opposite sides
 - c) **My:** multiply or divide
 - d) **Cat-**Check your solution
 - e) **Whiskers-** Way to go! You are done!
3. Model how to use the mnemonic to work through equations.
 - a) Show them how to follow each step of the mnemonic so they can see how to go through the entire process of solving equations.
 - b) Also, model how to come up with positive self-statements to remind them of how to stay on track when solving multi-step equations (e.g., “What do I remember about distributing?” “What does each part of the Catch step represent?” “What do I do if the variables are on the same side of the equation?” “What if the variables are on opposite sides of the equations?” and “What can I try to do if my solution does not check?”).
 4. Use notecards to help the students practice memorizing each part of mnemonic.
 - a) Display part of the mnemonic for the students to recite.
 - b) Display equations that were partially solved, then have students explain what step of the mnemonic they were on.
 5. Guided Practice for the students
 - a) Give students the opportunity to solve equations on their own.
 - b) As they are working on their problems, monitor their work and ask them probing questions about why they are taking certain steps.
 - c) Remind them to fill out the self-monitoring sheet after completing their work and to include how well they felt they followed the mnemonic and participated in each lesson.
 6. Independent Practice
 - a) Lastly, have students solve equations without any support from you.
 - b) After they finish, talk with them about any errors they made and provide clarification for why they missed a problem and how the mnemonic could have been used to prevent that error from occurring again.

Evaluation

After giving feedback on independent practice, give students a quiz on solving multi-step equations including at least two problems with parentheses, at least two problems with like terms on both sides of the equal sign, and solutions that range from 0-15.

Lesson Plan Based on:

Cuenca-Carlino, Y., Freeman-Green, S., Stephenson, G. W., & Hauth, C. (2016). Selfregulated strategy development instruction for teaching multiple step equations to middle school students struggling in math. *The Journal of Special Education*, 50, 75-85.

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