

Problem Solving STAIR Report

By: Stephanie Green

This project was developed to address the learning approaches to solving word problems. In teaching math, I have observed students who have tremendous difficulty applying mathematical skills when a problem is proposed to them in words and is about a given situation. In order to concentrate on these needs, I created the Stand Alone Instructional Resource, *Got A Problem? Here's the Solution*, to foster student achievement in problem solving.

In using this STAIR presentation, students will be able to review multiple problem solving strategies and understand that these strategies can be utilized in different problem solving situations. Students will understand the steps necessary for solving word problems and be able to interact with the information given in order to process the knowledge gained. Students will then have the opportunity to apply their knowledge to practice solving word problems. As part of the assessment of this resource, students will extend their understanding to create and solve their own word problem and post their response to our class wiki space.

This presentation is linked to curriculum standards both nationally and in the state of Michigan as listed below:

NETS:

1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

c. use models and simulations to explore complex systems and issues.

4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

METS:

6-8.CT. Critical Thinking, Problem Solving, and Decision Making - By the end of Grade 8 each student will:

3. gather data, examine patterns, and apply information for decision making using available digital resources

6-8.RI. Research and Information Fluency - By the end of Grade 8 each student will:

1. use a variety of digital resources to locate information

Michigan Content Standards:

N.FL.06.02 Given an applied situation, write a mathematical statement to represent the situation.

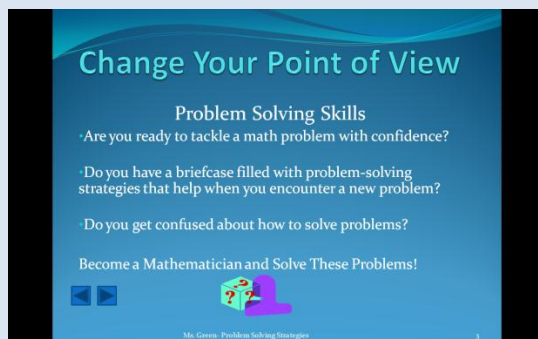
N.MR.06.13 Solve contextual problems involving rational numbers

N.FL.06.14 For applied situations, estimate the answers to calculations involving operations with rational numbers.

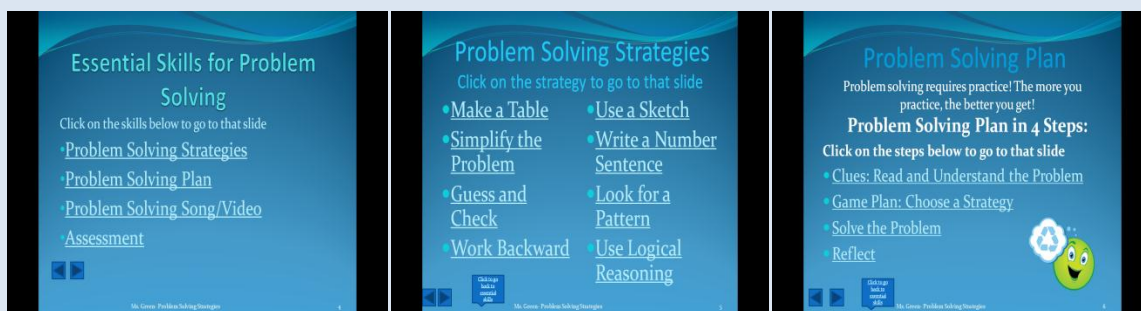
N.FL.06.15 Solve applied problems that use the four operations with appropriate rational numbers.

The instructional strategies that I employed within this presentation are Inquiry Based Instruction, Inductive Learning and Deductive Learning Instruction. In **Inquiry Based Instruction-**

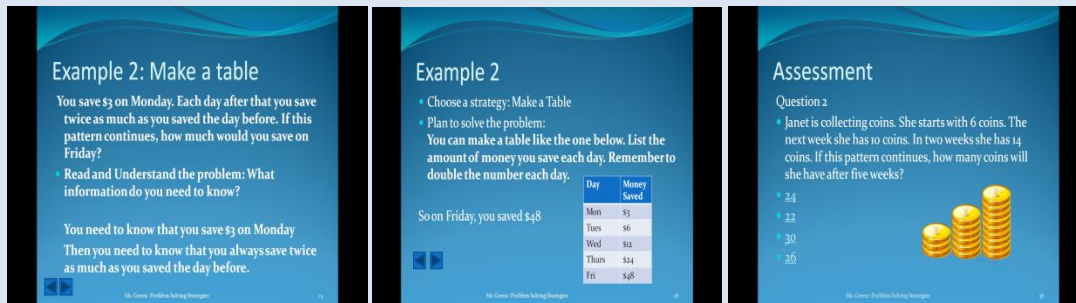
Problem solving is a critical thinking skill necessary for addressing issues related to technology and for developing effective solutions to practical problems. Students will take on the role of Mathematicians and solve real world problems. By completing this interactive presentation, students will gain the necessary knowledge to apply these skills, as mathematicians, to new problem solving situations. An example of this type of instruction from the presentation is shown below:



Inductive Learning Instruction- This learner-centered presentation allows students to be responsible for their own learning methods. Students are required to think about each basic strategy and relate the use of that strategy to a problem. Students base their learning on processes that they already know and scaffold these ideas into their new learning. Within the presentation, students can review specific problem solving strategies as well as the plan for solving these problems. Examples of this type of instruction from the presentation is shown below:



Deductive Learning Instruction-Students view the presentation as a type of lecture the instructor might give. They then use these principles to derive appropriate mathematical models. Students are shown illustrative applications of the models, and within the presentation, students are given practice examples for similar math problems along with applications of those examples. Lastly, students are tested on their ability and knowledge to successfully answer contextual problems correctly. Examples of this type of instruction are shown below:



As an active response, students will be given a multiple choice quiz at the end of the presentation that will require them to input their answers to each word problem. Once students have selected a response, they will receive immediate feedback on their quiz. If he or she answers the question correctly, they will be prompted to a box that reads: "Excellent! Click Continue to go on to the next problem". If they answer incorrectly, the box will prompt them to "Oops! Try Again! Hint: Reread the problem. What is the problem asking you to find out?" On incorrect responses, the hint is appropriate for each wrong response. Examples from the presentation of feedback based on student responses are shown below:



In designing this STAIR, it was my objective to give them the tools that they would need to successfully solve word problems. Life is full of scare words. For many people the mention of "word problems" causes their thinking ability to diminish or shut down. The purpose of this presentation was to give my students the confidence to handle those dreaded "problem words". The reason that this is important is that life is also full of word problems. Students will run into problem solving in all aspects of their life and learning how to find solutions to given situations allows them to apply these much needed skills. I think my strengths in addressing these issues in my presentation lie in supplying students with the "briefcase" of example strategies, the clue words to help them decode the problem and choose the appropriate operation to use, and a game plan that can be relevant in any problem solving situation. I also provided students with a stimulating song to help them remember the process that they have learned. Since the presentation gives immediate feedback, it allows students to know whether or not they are on the right track. If they find that they keep getting the wrong answer, I have provided them links to the internet that can give them even more practice. Finally, I have extended their problem solving abilities by having students create their own problems and discuss their problem solving

strategies on our discussion board. This was meant to encourage students to share their ideas on how to solve a problem and help them see the process of how to crack the code of word problems by writing them. Hopefully they can then see the patterns that all problems have and be able to synthesize the new problems they encounter. I see the biggest weakness of my STAIR as not supplying all of the problem solving strategies that they could use to solve a problem. I included only eight because I wanted to prevent sensory overload or students getting lost within the presentation. I also did not include an assessment question for each one of those strategies, although they could have chosen more than one strategy to solve each of them, thus using each strategy, but of course, that was not guaranteed. In retrospect, I could have included links on the assessment problems to those strategies that they could have found helpful. All in all, though, I believe this resource will be effective in teaching students the skills they will need to analyze and solve word problems.

Using a resource like this allows students to direct their own learning and work at their own pace. It is fantastic for differentiating instruction, where higher students could complete a webquest on problem solving skills following the STAIR and lower students could focus on just the specific areas that they feel they need the most help on. In this way, students are challenged on their own levels and can address the concerns based on their own needs.