Professional Development Institute

Flex Course Syllabus

Math Problem-Solving Strategies for Grades 3-6

PDI Course Number: 32T02

UCSD Course Number: EDUC41594

If you would like information about receiving post-baccalaureate (graduate) credit for completing this course, please click here.

Course Timeline

Participants have one year to complete the course. Participants must spend a minimum of three weeks in this course.

Course Description

Why do students seem to have such a difficult time with the mathematical problem-solving process? Mathematics standards have shifted the focus from teaching problem solving to teaching *via* problem solving. This online course is designed for teachers in grades 3-6 who want to help their students become critical and logical mathematical thinkers. Specific strategies are introduced that improve the way students approach math problems. Information on the problem-solving process is shared together with distinct suggestions for incorporating specific problem-solving strategies such as choosing an operation, finding a pattern, making a table, making an organized list, drawing a picture or diagram, guess and check, working backwards, and logical reasoning. Teachers will also learn effective grouping strategies for student-centered learning. The role of assessment in the problem-solving process, as well as assessment techniques specifically for problem-solving will also be provided. By the end of this course, teachers will more fully understand how to best help students apply their logic and reasoning to real-world math problems as well as how to appropriately assess students in the problem-solving process.

Educational Objectives

1. Teachers will learn about the nine habits which support numerate thinking.
2. Teachers will understand the basics of the Common Core State Standards for Mathematics and NCTM Standards.
3. Teachers will understand how mathematics assessments guide instruction and will learn the fundamentals of the most popular assessments including PARCC and Smarter Balanced.
4. Teachers will learn the four steps to the problem-solving process and specific strategies to record the same.
5. Teachers will learn how to use problems as a teaching tool in a student-centered classroom.
6. Teachers will learn valuable grouping strategies.
7. Teachers will learn how to use activities and strategies provided to teach and reinforce important problem-solving concepts.
8. Teachers will learn strategies for strengthening problem-solving skills when choosing an operation.
9. Teachers will learn strategies for strengthening problem-solving skills when finding a pattern.
10. Teachers will learn strategies for strengthening problem-solving skills when making a table.
11. Teachers will learn strategies for strengthening problem-solving skills when making an organized list.
12. Teachers will learn strategies for strengthening problem-solving skills when drawing a picture or diagram.
13. Teachers will learn strategies for strengthening problem-solving skills when guessing and checking.
14. Teachers will learn strategies for strengthening problem-solving skills when working backward.
15. Teachers will learn strategies for strengthening problem-solving skills when using logic to solve problems.
16. Teachers will learn how to create problems that result in real-world implications in order to make mathematics meaningful for their students.
17. Teachers will discover the benefits and advantages of using math manipulatives in the classroom.
18. Teachers will learn specific strategies to incorporate manipulatives into their mathematics instruction in order to challenge their students' problem-solving abilities.
19. Teachers will learn how to use math manipulatives to link concrete ideas with abstract concepts.
20. Teachers will have an appreciation for and will learn the importance of the reading-math connection.
21. Teachers will learn how to use literature as an example and inspiration for problem solving.
22. Teachers will have a basic understanding of how formative assessment helps drive further mathematical instruction.

23. Teachers will be able to properly use formative assessment to help guide instruction.
24. Teachers will discover ways to assess their students' problem-solving process.

Instructional Media

- Online Discussions
- Online Engagement
- Online Collaboration
- Instructor Feedback
- Instructor Interaction
- Online Resources and Websites
- Supplemental Instructional Materials
- Printable Classroom Resources

Evaluation

- Test #1 (5% of final grade)
- Test #2 (5% of final grade)
- Test #3 (5% of final grade)
- Test #4 (5% of final grade)
- Test #5 (5% of final grade)
- Autobiography and Goals for the Course (10% of final grade)
- Article/Video Reflection (15% of final grade)
- Course Collaboration/Share Ideas with the Class (10% of final grade)
- Cumulative Assignment/Project: Create Real-World Math Problems (20% of final grade)
- Culminating Practicum (20% of final grade)

Topical Outline

Unit One

- Why Problem Solving and Critical Thinking Skills are Important
- Introduction to the NCTM Standards and the Common Core State Standards for Mathematics
- The Role of Mathematics Assessments
- **Assignment #1**
  Write an autobiography including information about yourself, your grade level and what you specifically hope to learn about implementing math problem-solving skills in the 3-6 classroom. Your autobiography should be a minimum of three paragraphs.
- **Quiz #1**

Unit Two

- The Problem-Solving Process
- Student-Centered Teaching: Using Problems as a Teaching Tool
- Grouping Strategies
- **Assignment #2**
  As an educator, it is important to be aware of the research, studies, and professional work done in the field. In the course, you will find an article and video that are relevant to the specific course content. Read the article and then write an essay with your thoughts.
- **Quiz #2**

Unit Three

- Problem-Solving Strategy #1: Choose an Operation
- Problem-Solving Strategy #2: Find a Pattern
- Problem-Solving Strategy #3: Make a Table
- **Assignment #3**
- *Online Discussion Board Participation/Engagement: Please post a tip, strategy, or idea that specifically relates to using problem-solving skills to teach math content and will make a difference to other teachers in their own classrooms. Your assignment should be a minimum of three paragraphs and detailed enough for another teacher to easily follow. This is a great opportunity to share and collaborate with other teachers at your grade level around the country. Take time to review and respond to other postings that are relevant to your classroom population in order to gain effective ideas to use immediately in your classroom.*
- **Quiz #3**

Unit Four

- Problem-Solving Strategy #4: Make an Organized List
- Problem-Solving Strategy #5: Draw a Picture or Diagram
- Problem-Solving Strategy #6: Guess and Check
- **Quiz #4**

Unit Five

- Problem-Solving Strategy #7: Work Backward
- Problem-Solving Strategy #8: Logical Reasoning
- Make it Meaningful – Real-World Problem Solving
- **Quiz #5**

Unit Six

- The Use of Manipulatives in Problem Solving

- Using Literature to Teach Problem-Solving Skills
- Assessing Problem Solving
- **Assignment #4**
  Create a real-world math problem for each of the problem-solving strategies that have been discussed in the course. You will create a total of eight problems which can be solved using the problem-solving strategy that is being showcased.
- **Assignment #5**
  The culminating practicum is a three-step process. (1) In the first assignment, you were asked what goals you had and what you hoped to learn from the course. Think back to your original goals for this course. Write a minimum two-paragraph reflection specifically describing how what you learned can be used to help you reach those goal(s). (2) Next, write a minimum three-paragraph plan that specifically describes the ways in which you intend to implement a particular strategy you learned in this course into your own teaching situation. (3) Last, write a minimum two-paragraph reflection describing a student you have or have had in the past. Then, discuss how the strategies you learned in this course will specifically benefit that student as you put your plan into action.

Bibliography

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