Pedagog.ai

Diverse Solutions with AI: Explaining Why Students Got Different Answers on Math Problems

Why?

This lesson can be used at any time when students are struggling to understand why they arrived at different answers, focusing specifically on mathematical problem solving. In it, students use generative AI to explore mathematical problem-solving, enabling students to compare and contrast their approaches to various problems. It aims to enhance students' critical thinking and problem-solving skills by examining why different methods may lead to the same or different answers. This approach builds a deeper understanding of mathematical concepts and encourages collaborative learning.

Materials Needed

- Computers or tablets with internet access for each student or group.
- Access to ChatGPT or similar generative AI tool.
- Projector or screen to display problem statements and AI responses.

Time needed

Approximately 15 to 45 minutes, depending on the complexity of problems being analyzed

Objectives

Students will be able to...

- Articulate the reasoning behind their mathematical solutions.
- Compare their problem-solving methods with those of their peers and AI-generated solutions.
- Evaluate the effectiveness of different problem-solving strategies.

Key Concepts & Vocabulary

- **Heuristic**: A technique designed for problem-solving, learning, or discovery.

Lesson

1. **Introduction**: When a difference in students' answers on the same problem shows up in class, highlight this as an opportunity for deeper learning and understanding.
    a. Introduce the use of a generative AI tool like ChatGPT, explaining how it can help analyze and generate different methods of solving math problems, thus offering insights into various solving strategies.
2. **Note**: This lesson could be used even without students working on a problem

first. You could give students a problem and two possible answers, asking them to determine what process would be used to get each of the two answers.
    a. For example, you could use a viral division problem that took social media by storm in 2019:
    b. $8 \div 2(2 + 2) = ?$
    c. In that equation, different people got either 1 or 16 as the answer, depending on how they set up the problem.
3. **Problem Solving**: Have students work either individually or in pairs.
    a. Students first take a look at their work to see if they can determine why they got different answers.
4. **Using AI**: Guide students to input their answers on the same problem into a generative AI tool such as ChatGPT.
    a. They should give both of their answers and ask the AI to describe how they likely got the answers. This step is crucial as it introduces students to alternative perspectives and methodologies, enhancing their understanding of the subject matter.
5. **Comparison and Analysis**: Have students discuss the solutions they developed, and how well the AI explained their processes.
    a. This comparison should focus on understanding why different approaches were used and the mathematical principles underlying each method.
    b. In some cases, it may be challenging to input the mathematical problem into the chat. (For example, problems that use mathematical symbols that aren't easy to type on the keyboard.) Have students work to describe their problem in words.
    c. Students may be focused primarily on who was right. A more productive outcome is all the students understanding the process they each went through, and analyzing how they can modify their processes in the future to avoid the same mistakes.
6. **Class Discussion**: Lead a broader discussion to synthesize the day's learning.

Discussion Questions

- What did you learn about your own problem-solving process by comparing it to the AI's and your peers' methods?
- How did the AI's explanation help you with your understanding? Was it clear, or did it make the problem more confusing?
- What are the benefits and limitations of using AI in problem-solving?

Supplemental Activity Ideas

- **Problem Creation**: Have students create their own math problems, input them into the AI, and see how the AI solves them.
- **Applied Math**: Use AI to come up with real-life applications for the topics being studied in class.