Prompting Students to Explain

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[Title]

Prompting Students to Explain

[Competency]

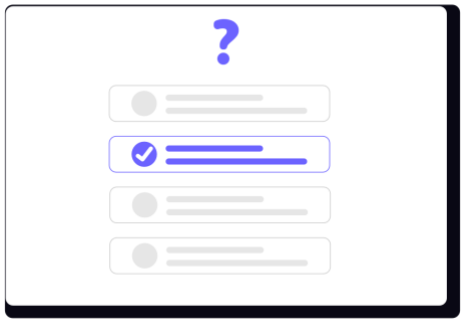
Apply Tutoring Skills

[Estimated Time]

12 minutes

[Undraw Key]

Correct Answer



[Description]

When tutors prompt students to explain their thinking, students don't just "do" math — they learn math more deeply.
Research shows that explanation prompts help students reflect, identify mistakes, and build conceptual understanding.

[Learning Objectives]

- Use open-ended prompts that invite student explanations.
- Guide students who give incomplete or incorrect explanations.
- Reflect on how explanation prompts improve learning.

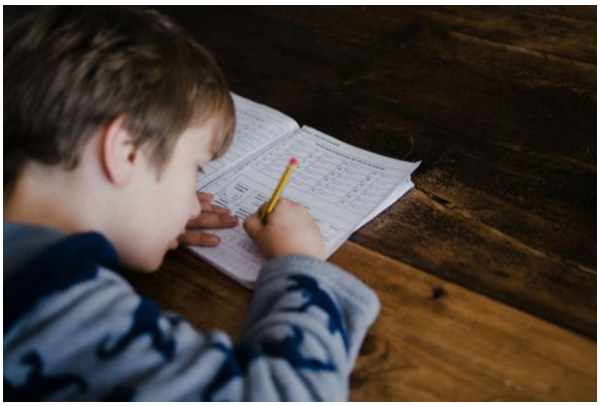
Tutor's Experience Level:
How would you describe your tutoring experience and skills?
Beginner tutor- 1 (no experience)
Expert tutor- 5

[Text]

Scenario 1
Before we begin, let's reflect on what you already know about prompting students to explain their thoughts.

You're tutoring a student named Jake. He is working on a math problem involving fractions. Jake solves the problem quickly but doesn't explain how he arrived at the answer. As his tutor, you are unsure whether Jake understands the math concept, and you want to ensure his understanding.

[Image]



[image link]
Description: student working in a math notebook

[Question - Open Ended]

1. What exactly would you say to the student to check his understanding and prompt him to explain his reasoning and thought process?

[Question - MCQ]

2. Which of the following strategies would best encourage the student to explain his reasoning?

I would say to the student:

A. "Jake, great job! Let's move on to the next problem. I want to see how you do."
B. "Jake, can you explain how you got that answer? I'd like to hear your thoughts."

C. “Jake, you’re so good at math! You always get these answers right.”
D. “Jake, I think you might have made a mistake. Let me show you how to solve it.”

[Question - Open Ended]

3. Why do you think the strategy you selected in the previous question will best encourage the student to explain his reasoning?

[Question - MCQ]

4. Which of the following statements aligns with the rationale you chose and explained in the previous two questions?

A. **Prompting students to explain their reasoning helps them reflect on their thought process, leading to deeper understanding.**
B. Telling students they are smart boosts their confidence and encourages them to explain their answers.
C. Correcting students immediately when they are wrong ensures they learn the right method.
D. Praising students for correct answers is enough to motivate them to explain their reasoning. When you praise students it encourages them to explain their thoughts.

[Text]

Research Says…

Research shows that when students explain their thinking, they learn more. This is because it helps them *think about their own thinking*–a process called metacognition. When students explain their thought process it helps them catch mistakes, better understand what they know, and strengthen their learning (Chi et al., 1994; Rittle-Johnson et al., 2017).

In the scenario above, the most effective strategy is:
“Jake, can you explain how you got that answer? I’d like to hear your thoughts.”

This type of question shows the student that you care about their reasoning, not just whether they got the correct answer. It invites them to talk through their steps, which helps them clarify their own thinking while giving you a window into their understanding.

Recent evidence reinforces this approach: Wang et al. (2024) found that tutors who prompted students to explain used higher-quality instructional strategies and their students were significantly more likely to master topics. Notably, less-experienced tutors saw the greatest gains, with their students improving mastery rates by up to 9 percentage points.

When you ask students to explain their thinking, keep these in mind:

- **Ask open-ended questions.** Avoid yes/no questions—encourage full explanations.

- **Focus on their process.** It's about how they solved it, not just if they were right.
- **Keep it judgment-free.** Even if the answer is wrong, show curiosity, not criticism.
- **Help them reflect.** Give them space to think about and adjust their approach.

Examples of effective prompts to students to encourage them to explain include:

- *Can you walk me through how you solved this problem?*
- *What steps did you take to arrive at this answer?*
- *Why do you think this approach worked?*
- *What would you do differently if you encountered a similar problem?*

Prompting students to explain their thinking doesn't just help them solve the problem at hand—it teaches them to reflect on their learning, identify gaps in their understanding, and become more confident, independent thinkers. By making space for students to explain, you're reinforcing one of the most effective strategies for deep, lasting learning.

[Question - Open Ended]

5. In your own words, explain why prompting students to explain their reasoning is important for their learning.

[Question - Likert]

6. How much do you agree or disagree with the expert belief of "Prompting students to explain their reasoning enhances their learning by encouraging critical thinking."

1. Strongly disagree
2. Somewhat disagree
3. No opinion
4. Somewhat agree
5. Strongly agree

[Question - Open Ended]

7. Explain why you agree or disagree.

[Question - MCQ]

Attention Checker: Pick one of the 4

8. To confirm you're paying attention, please select "Somewhat agree" below.
   A) Strongly disagree
   B) Somewhat disagree

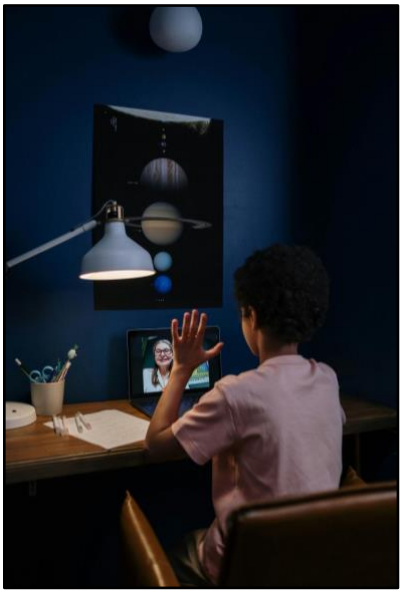
C) No opinion
D) Somewhat agree

[Text]

Scenario 2

You are tutoring a student named Ahan, who is solving a word problem that involves calculating the perimeter of a triangle. Ahan writes down an answer that is bigger than it should be. He does not do any calculations by hand. You prompt him, “that seems a bit large…” He nods, immediately erases the answer, and writes a new number that is smaller. It is still not correct. You start to ask him how he arrived at his answer, but he quickly erases it a second time and writes down the correct answer. He starts to move on to the next question.

[Image]



[image link]
Description: student at a laptop

[Question - Open Ended]

9. What exactly would you say to the student to check his understanding and prompt him to explain his reasoning and thoughts?

[Question - MCQ]

10. Which of the following strategies would best encourage the student to explain his reasoning?

A. Ahan, great job calculating the perimeter! You had some trouble the first two times, but you got it in the end and that's what matters.
B. It's great that you got that question right! It's also important to understand why it's right. Would you explain what steps you took to get your final answer?
C. It looks like you might have added too much in your first two tries. On your last try, did you add up the lengths of all the sides?
D. Ahan, I'm not sure how you solved this. I'll just explain how I would do it so you can compare. Does that sound good to you?

[Question - Open Ended]

11. Why do you think the strategy you selected in the previous question will best encourage the student to explain his reasoning?

[Question - MCQ]

12. Which of the following statements aligns with the rationale you chose and explained in the previous two questions?

A. Pointing out that the student seemed to struggle is a great way to encourage him to internally reflect on what went wrong so he can catch similar mistakes in the future.
B. Encouraging the student to slow down and think about his process gives him space to reflect before he rushes onto the next question.
C. Asking if the student used what you know to be the correct approach to solve the problem helps you make sure he really knows how to do it, and wasn't just guessing.
D. Letting Ahan compare his process to yours will help him improve, because he can use your approach next time.

[Text]
Conclusion & Feedback

Research shows that asking students to explain their thinking—especially through process-focused prompts—can lead to deeper, more lasting understanding.

In the scenario above, the most effective strategy is:

"It's great that you got that question right! It's also important to understand why it's right. Would you explain what steps you took to get your final answer?

When students talk through their reasoning, they strengthen their grasp of the material and can catch their own mistakes. This approach helps them reflect on their ideas and thought processes more deeply, which makes learning more meaningful and effective (Chi et al., 1994; Rittle-Johnson et al., 2017).

[Text]
References:

1. Chi, M. T. H., De Leeuw, N., Chiu, M. H., & LaVancher, C. (1994). Eliciting self-explanations improves understanding. Journal of the Learning Sciences, 12(1), 1-27. https://www.tandfonline.com/doi/abs/10.1207/S15327809JLS1201_4
2. Rittle-Johnson, B., Loehr, A. M., & Durkin, K. (2017). Promoting self-explanation to improve mathematics learning: A meta-analysis and instructional design principles. ZDM Mathematics Education, 49(4), 599-611. https://link.springer.com/article/10.1007/s11858-017-0834-z
3. Wang, R. E., Ribeiro, A. T., Robinson, C. D., Loeb, S., & Demszky, D. (2024). Tutor copilot: A human-ai approach for scaling real-time expertise. *arXiv preprint arXiv:2410.03017.*