

# Is That A Reasonable Answer?

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## What is the teaching strategy or technology employed?

Students were submitting homework responses with unrealistic solutions to quantitative problems in Stellar Astrophysics (PHYS 301) (e.g. speeds faster than the speed of light, calculated distances to Mars that were beyond the solar system, values for the brightness of Sirius (the brightest star in the night sky) as bright as the full moon, etc.). I asked students to write a discussion statement indicating that their response was reasonable. Here, they could mention why the units reported were appropriate, a restatement of the definition of key terms that led to their response, a comparison to known/familiar quantities, etc.

## What challenge or issue were you trying to solve or mitigate?

I thought that if students reflected and evaluated the outcome of their problem solving strategy through a requirement to consider how well their solution worked and what they learned from the experience, that that would help them to become better problem solvers. Instead, it seemed to mostly just be an additional burden to have to write down their outcome evaluations without a significant improvement of understanding. Namely, the students who already had a more firm understanding of the problem needed to spend additional time writing down their evaluation, whereas the students whose understanding was not yet fully developed did not seem to be benefiting from the process because they approached the evaluation step from a less developed understanding.



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## How did the students respond?

I would have known that the innovation was working if students were using the reflection step to confirm and/or adjust their reasoning or problem solving skills and thereby earning higher homework scores compared to past cohorts. I implemented the strategy into the first three homework assignments in my Winter 2025 Stellar Astrophysics (PHYS 301) course, but stopped the practice after it did not have the desired results. Namely, the students who were not getting correct answers often were also not able to produce reasonable information for the reflection statement, so it seemed like just an extra burden that wasn't significantly improving student learning. Even if students determined that their response was not correct, they did not go back and change it. Additionally, it was often the case that if a calculation wasn't done correctly, the student would compare their answer to a number they had looked up, and deemed it 'close enough' even if there was a discrepancy.

## Would you do it again? How would you modify it going forward?

While, in my mind, this idea was going to work miracles, it did not have the expected outcome when implemented. Specifically, homework scores did not improve, and nobody seemed to be benefiting from the additional requirement to explicitly consider how well their solution worked/matched reality. It turns out that reality in astrophysical applications is often mindboggling.