

Moon Phases: Misconceptions and Educational Research

Common misconceptions include:

- The Moon can only be seen at night
- The Moon makes its own light, instead of reflecting sunlight
- The Moon's phases are caused by the Earth's shadow
- The Moon's phases are caused by clouds
- The Moon's phases are caused by Earth's rotation on its axis
- The Moon's phases are caused by the Moon's rotation on its axis
- The Moon takes one day to orbit the Earth
- The Moon orbits the Sun instead of the Earth

Some research has been conducted on how students understand the Moon's changing appearance and position in the sky, and on most effective ways to teach this subject:

Learning about Phases of the Moon and Eclipses: A Guide for Teachers and Curriculum Developers

<http://aer.noao.edu/AERArticle.php?issue=7§ion=2&article=2>

Kavanagh, C., Agan, L., and Sneider, C., 2005, The Astronomy Education Review, Volume 4, p. 19–52.

Misconceptions about Moon phases and eclipses are widespread and resistant to change, even among adults. In the most prevalent misconception, children and adults confuse the explanations for phases and eclipses by assuming that lunar phases occur when the Moon enters the Earth's shadow. Research has found approaches based on a constructivist view of learning to be very effective with students in grades five and above. While much research needs to be done, the studies reported here offer ideas for how teachers and curriculum developers can help students achieve the goals outlined in the National Science Education Standards.

A Private Universe

<http://www.learner.org/resources/series28.html>

A powerful collection of video clips of students' astronomical ideas (seasons and moon phases) and how they change (or don't) with classroom instruction. ages five and above. While much research needs to be done, the studies reported here offer ideas for how teachers and curriculum developers can help students achieve the goals outlined in the National Science Education Standards.



Private Universe Project "Teachers Lab"

<http://www.learner.org/teacherslab/pup/>

Designed for classroom teachers, this site begins with a 5-question conceptual assessment survey of the visitor's ideas about lunar phases and seasons. The information is presented with a discussion of typical responses. Classroom activities are presented and a forum is available for educators to share their questions, ideas, and experiences.

Trundle, K.C., Atwood, R.K., & Christopher, J.E., 2002, Preservice Elementary Teachers' Conceptions of Moon Phases Before and After Instruction, *Journal of Research in Science Teaching*, 39(7) 633.

This study focused on the conceptual understandings of 78 preservice elementary teachers about moon phases, before and after instruction in an inquiry-based physics course. Their report provides a table describing the results of many previous studies on this topic. Post-instruction interviews showed that 76% of participants demonstrated scientific understanding after the inquiry unit.

Trundle, K.C., Atwood, R.K., & Christopher, J.E., 2003, Preservice Elementary Teachers' Conceptions of Moon Phases: A Longitudinal Study, Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, March, Philadelphia, PA.

The authors interviewed 12 participants from the previous study who had received instruction on the moon phases in an inquiry-based physics course, six or thirteen months after instruction. A majority continued to hold a scientific understanding months later, but three reverted to alternative conceptions.

