

## No, Dog, No! Assessing Moon Phase Misconceptions Using Children's Literature

Robert Swanson

Literature is abundant regarding misconceptions on Moon phases and children's books, but have you thought about using them to assess your college students?

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Others have examined representations of the Moon in children's literature (e.g. Trundle, Troland and Pritchard, 2008) and have made recommendations to educators on book usage. One of those is that children's books (either with correct or incorrect representations of Moon phases) can be used in inquiry-based activities in which students' regular observation of Moon phases can be brought to bear on the illustrations in the books. In this approach, students can compare and contrast their observational data with the book representations. Another suggested approach is for a teacher to carefully review books in advance and make sure that only scientifically accurate nonfiction books are used in Moon phase instruction. This is because a considerable number of children's books include misrepresentations of Moon phases. A third option offered is for an instructor is to pair a work of fiction with a scientifically accurate nonfiction book so that students can compare and contrast in order to resolve any misconceptions regarding the phases of the Moon.

You would not expect children's books to be anywhere near a college-level Introduction to Astronomy classroom textbook. However, I have found a way to make them work for me -- less as an instructional technique and more as an assessment tool. During instruction, I use scientifically accurate diagrams and simulations to teach about the Moon phases, occasionally throwing an inaccurate, but similar, diagram to make sure that students are catching on. My use of illustrations from children's books as an essay question on an exam is an attempt to challenge my students, probing to see whether they can extend their knowledge derived from science-book diagrams and simulations to an unexpected, less-scientific context.

### *From the Requests of Babes...*

As a parent of three small boys, I spend a lot of time reading children's books, often the same ones over and over again. During a recent and unexpected break from school (snow days are rare in northeastern Mississippi), my youngest requested repeated readings of P.D. Eastman's *Go, Dog! Go!* (1989). This book has been a favorite of all my boys and I can nearly recite the text from memory. Far from breeding contempt, this familiarity simply afforded me the chance to pay particular attention to the illustrations. As an astronomy instructor, two pictures in particular got my attention. In the first, a big group of dogs have piled into bed for a long night's sleep. A waxing crescent Moon is shown in the bedroom window. Since this phase is indeed visible in the evening sky, there is nothing wrong with this, as long as the window is facing toward the West. The very next page, however, has the dogs springing into action as the Sun rises in the very same window, with the accompanying text, "Get up! It is day. Time to get going. Go, dogs. Go!" In order for this to happen, the house would have had to execute a complete 180-degree turn in order to face East by morning. The only other explanation is that these dogs are very heavy sleepers and we are seeing the Sun in the western sky the following evening. Talk about letting sleeping dogs lie!

Since this snow day vacation fell during a time in which I was preparing the first test of the semester for my Introduction to Astronomy class, I immediately knew that I had just come up with an excellent essay question for my students. I enlisted my boys to rifle through the remaining books in the Swanson family library to find other illustrations of Moon phases. I marked the appropriate pages with sticky notes and brought the stack of books with me on test day. The instructions for the essay question were simple -- select two of the children's books and describe what is right or wrong with the Moon phases and/or Sun position as presented.

### ...To the Minds of Students

By way of background, I teach the Moon phases using “The Cause of Moon Phases” and “Predicting Moon Phases” from the CAPER team’s lecture-tutorials (Prather et al, 2008) as well as simulations (University of Nebraska-Lincoln’s “Lunar Phase Simulator,” <http://astro.unl.edu/naap/lps/lps.html> ). I also have my students build lunar phase dials as designed by Kevin T. Denhe (2010) which they are allowed and encouraged to use on quizzes and tests. By the time the test rolls around, they should be quite familiar with the necessary orientation of Sun/Earth/Moon in order to produce the various Moon phases and their shapes. They also know the approximate times of moonrise/set and in which direction one would need to look in order to see a particular Moon phase. In short, coming into the test, they are equipped with all the knowledge necessary to critically examine the illustrations and text in children’s books.

Even though they had not seen such illustrations during class, many were able to explain the inaccuracies on the exam. Some were even excited by the challenge. One particular student wrote:

This activity even got me to stop and really think about it and changed my point of view on children books among other things. I would have never thought to look at that, but now I instantly look at my kids' books and wonder. It was thought-provoking, which is something schools these days need more of.

For those wishing to try this assessment activity in their classes, I provide here a list of other examples:


*Yertle the Turtle* (Seuss, 1986) – Moon phase is waning crescent, but text reads, “The Moon of the evening was starting to rise.” Waning crescent Moon does not rise until the wee morning hours.

*Kiss Goodnight* (Hest, 2001) – Bedtime for the main character, Sam, should be in the evening, but the Moon phase shown is waning crescent (which, again, would only be visible in the early morning hours).

*Harold and the Purple Crayon* (Johnson, 1986) – Moon is impossibly always in the sky in almost the same position during his night’s adventure.

*The Going to Bed Book* (Boynton, 1995) – Text says, “And when the Moon is on the rise,” but the Moon phase pictured is the waxing crescent Moon, which is only easily visible just before it is about to set.

*You’re All My Favorites* (McBratney, 2004) – Moon phase shifts abruptly from waxing crescent to waning crescent. While not impossible, it would require that the events of the book occur during a time span of several weeks. It would also require a change in the bedtime for the bears from evening (waxing crescent) to early morning (waning crescent).

*Cowlick* (Ditchfield 2007) – Viewing the rise location of the Moon (full moon) in comparison with the rise location of the Sun, it turns out that the illustrations are pretty much correct. The caveat (and challenge for the student) is to realize that the pictures are only correct during the winter months (declination of the Moon is positive while declination of Sun is negative). 

### REFERENCES

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Robert Swanson is a Physics and Astronomy instructor at Itawamba Community College, Fulton, MS. He can be reached at [rsswanson@iccms.edu](mailto:rsswanson@iccms.edu).

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