# Predict-Observe-Explain

Procedure:

1) Based on either a conceptual model, physical model or computational model, students predict what data from the system under consideration would look like under various conditions.
2) Students examine professionally collected data taken under a range of conditions, looking for the presence or absence of predicted patterns.

Theory of Action:

Working out the predictions attunes students to the relationship between candidate causal processes and observable behaviors in the system under consideration. Then, when they explore the data, they have an idea what they are looking for; they have a specific search pattern in mind, and can draw on the human brain's strong pattern-recognition ability. They also see that reality is not as clean and simple as theory would predict.

Example:

1a) Class discusses what observable phenomena might be created by an exoplanet orbiting a star, and conclude that the star's light level would diminish as the planet passes between an observer on Earth and the star (called a "transit").
1b) Students use an interactive computer model of a transiting planet to explore the pattern of star brightness observed from Earth versus time.
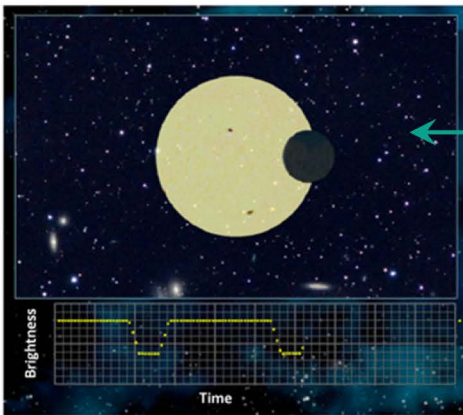
2a) Students direct one of five MicroObservatory telescopes to image the sky at a chosen time and place. These telescopes are not quite professional caliber, but they are beyond what a school would have.
2b) Students look for predicted pattern of diminished brightness.
2c) Students use physics, math, and reasoning to make further inferences about planet's size, orbital period, and distance from Earth.

Gould, P., Sunbury, S., & Krumhansl, R. (2012). Using online telescopes to explore exoplanets from the physics classroom. *American Journal of Physics, 80*(5), 445-451.