

The Process of Uncovering the Secrets of Nearby Astronomy : An Active Learning Activity Set to Foster Analytical, Computational Thinking, and Investigative Skills

Monday, 1 September 2025 11:00 (15 minutes)

This set of activities was developed for the astronomy elective course offered since 2022 to upper secondary school students in the Science-Mathematics program at Sathasamut School. The primary goal is to enhance students' skills in analytical and computational thinking, observation, and inquiry within the field of astronomy, helping them recognize its relevance to everyday life and foster a deeper interest in astronomical learning.

In the previous academic year, the activities combined project-based learning and lesson analysis from research studies. However, limited foundational knowledge and varying academic levels made comprehension difficult for many students. In the current academic year, the teacher has redesigned the learning activities to better align with students' contexts. The content scope was structured around accessible observational astronomy topics, sequenced from the study of the Moon, planets in the Solar System, introductory exoplanet studies, to basic sky observations. The activity set was developed under the concept of active learning, encouraging students to engage in hands-on activities and apply analytical reasoning, computational thinking, observation, and inquiry skills.

The activity set, titled "The Process of Uncovering the Secrets of Nearby Astronomy," spans 30–35 hours and is aimed at Grade 10–12 (equivalent to M.4–M.6) students. It comprises four learning units:

Unit 1: The Moon

- Lunar phases and moonrise/moonset times
- From Lunar Eclipse to Earth's Size Estimation
- Measuring lunar crater sizes

Unit 2: Planets in the Solar System

- Exploring our solar system
- Kepler's laws: planetary motion
- Kepler's laws: calculating planetary masses

Unit 3: Exoplanets

- Analyzing exoplanet data
- Methods and resources for studying exoplanets

Unit 4: Basic Sky Observations

- Celestial coordinate systems
- Identifying stars

Evaluation results indicated that the activity set successfully enhanced students' skills in computational thinking, analytical reasoning, observation, and inquiry. Over 52% of the students demonstrated high proficiency in these process skills. Satisfaction surveys showed that 92.9% of the students significantly expanded their astronomical knowledge. Individual interviews further revealed that the activities broadened students' perspectives on astronomy, made the subject more engaging, and inspired them to pursue further learning in the field of astronomy.

Primary author: CHONHAI, Pachareeya

Session Classification: Oral Presentation

Track Classification: Classroom Activities