Oregon Museum of Science and Industry

ASTROPHYSICS ON A TABLETOP

1. OVERVIEW DESCRIPTION

Astrophysics on a Tabletop challenged high school-aged youth to develop hands-on activities about astrophysics and then produce short films showing those activities in action. This program included lessons about astrophysics, science communication, careers in science, and videography.

A. Universe of Learning Resources

1. AstroPix - https://www.astropix.org/
2. ViewSpace - https://viewspace.org/
3. Subject Matter Experts - https://universe-of-learning.org/informal-educators/request-an-expert

2. PROGRAM DETAILS

A. Goals

1. High school-age youth learn about astrophysics.
2. Participants further their communication, activity development, and professional inquiry skills.
3. Museum staff strengthen their approaches for co-developing activities with youth.

B. Target Audience

1. High school-age youth
2. The general public

C. Timeline or Schedule of Events

Astrophysics on a Tabletop was conducted over six weeks; the students met once per week for two hours.

Week 1	*Introduction to astrophysics*
Week 2	*Activity brainstorming/prototyping*
Week 3	*Guest visit from an astronomy professor/activity prototyping*
Week 4	*Activity prototyping/videography lesson*
Week 5	*Script videos/film videos*
Week 6	*Debrief with Universe of Learning personnel*

3. PROGRAM MODEL

A. Staffing
Two primary staff members ran Astrophysics on a Tabletop programming, and one additional staff member helped out occasionally. It's extremely helpful if staff members have some knowledge of astrophysics and video editing.

B. Recruitment
We recruited roughly 15 high school-aged youth from an existing volunteer program at the Oregon Museum of Science and Industry. The students were divided into two groups, and each group met for 2 hours per week for 6 weeks. (In hindsight, a longer program—8 or 10 weeks—would have been beneficial.)

C. Space requirements
Worktables, computer and projector, multiple internet-enabled computers loaded with Adobe Premier or other video-editing software, a quiet space for filming.

D. Ideas for the first week's content ("Introduction to astrophysics")
The goal of the first session is to introduce students to astrophysics. We suggest providing an overview of several major realms of astrophysics, such as concepts of scale and distance and the fact that looking out in space means looking back in time. ViewSpace videos (produced by NASA's Universe of Learning) are a good resource, particularly the "Galaxy Evolution theme" and "Galaxy Structure." Activities created by the Astronomical Society of the Pacific are valuable as well, particularly Galaxy Sorting. The NASA's Astronomy Picture of the Day website is also a fun and quick way to introduce different astrophysics topics. As participants engage with these resources, encourage them to write down ideas about concepts they'd like to explore in an activity. Show a video of a hands-on activity to give participants ideas about clearly communicating astrophysics topics—one example are videos from the NASA-funded Space and Earth and Informal STEM Education project about detecting extrasolar planets.

E. Tips for activity prototyping
Assign participants to small groups (2–4 people) and provide each group with a small budget ($50 or so) for supplies. Encourage participants to brainstorm ideas and sketch out concepts on paper before using any supplies. It's useful for participants to have access to internet-enabled computers at this point.

As participants design their activities, encourage different groups to give and receive feedback. It's helpful to implement the principle of Team-Based Inquiry by having participants think about what works well in an activity and what could be improved (for guiding questions, see page 54 of this document from the National Informal STEM Education Network).

F. Guest visit
It's fun and informative to have a visit from a guest subject matter expert. At the Oregon Museum of Science and Industry, our participants interacted with a professor of astronomy from a local college. However, anyone working in a science- or science communication-related field (e.g., a museum educator, an astronomer working at a research center) can offer valuable insights.

G. Filming considerations
At the Oregon Museum of Science and Industry, we had participants film their

activities. This optional extension introduced participants to videography and also resulted in a long-term record of each group's work. We used Adobe Premier for video editing, and one of our staff members provided a roughly 30-minute introduction to this software. In hindsight, our participants would have benefitted from a deeper introduction to Adobe Premier. It's helpful if there's sufficient space so groups can spread out and find quiet areas for filming.

H. Debrief

We coordinated with Universe of Learning personnel and Oregon Museum of Science and Industry staff to organize a virtual debrief session with participants on the last day of the program. This session, which lasted roughly one hour, allowed Universe of Learning personnel and museum staff to ask the participants questions and view their videos. The participants were also able to ask questions about careers in science and science communication, which they reported was helpful.