WWT in Education

WWT Ambassadors - Projects and Fundraising

• WWT ThinkSpace Labs, funded by NSF award DRL-1503395, $1.4M (2015-2018)

• Bucknell WWT Labs for Astro 101, funded by NSF award DUE-1140440, $200k (2012-2016)

• Bringing the Universe to America’s Classrooms, funded by NASA-CAN, $160k for WWTA (2017-)

• WWT Life in the Universe Lab, funded by John Templeton Foundation, $500k (2015-2018)
ThinkSpace: Spatial Thinking in Middle School Astronomy Labs

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Harvard-Smithsonian Center for Astrophysics

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Boston College

This work has been funded by NSF award DRL-1503395
Project OVERVIEW

ThinkSpace labs teach astronomy while supporting spatial thinking skills, like imagining a scene from multiple viewpoints.
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Lab Options
1) Moon phases and eclipses
2) Seasons
Spatial Thinking and STEM

• Spatial skills correlate with performance in science domains, and likelihood to enter a career in STEM (e.g. Hegarty, 2014, Wai et al. 2009, 2010)
Spatial Thinking and STEM

- Spatial skills are malleable and can improve with practice (e.g. Uttal et al., 2013)
WWT ThinkSpace Moon Lab

- 3-day lab experience tested with middle school students
- Focus on WHY we experience Moon Phases and Eclipses
- Students use physical and virtual models (WorldWide Telescope) to understand the Moon phenomena and practice perspective taking skills
WWT ThinkSpace Seasons Lab

- 8-day lab experience tested with middle school students
- Blend of WWT views and physical models
- Focus on connecting space based and earth based perspectives
Student Gains: Moon Phases & Seasons Questions

Cohen’s d = \frac{\text{Average}(\text{Posttest Score} - \text{Pretest Score})}{\text{stdev}(\text{Pretest Score})}

WWT Moon Phases: Cohen’s d=1.2±0.2; N=330
WWT Seasons: Cohen’s d=1.5±0.2; N=290

Cohen’s d \sim 0.2 \rightarrow \text{small effect}
Cohen’s d \sim 0.5 \rightarrow \text{medium effect}
Cohen’s d >0.7 \rightarrow \text{large effect}
Student Gains: Spatial Thinking Questions

Effect Size = \[
\frac{\text{Average}(\text{Posttest Score} - \text{Pretest Score})}{\text{stddev}(\text{Pretest Score})}
\]

Spatial Thinking: Cohen’s d = 0.3 ± 0.2; N = 630

Cohen’s d ~ 0.2 \quad \text{small effect}

Significant gain when compared with control groups who did not use WWT ThinkSpace Labs
Building an Understanding of Astronomical Sizes and Scales with WorldWide Telescope

Ned Ladd, Katharyn Nottis, Evan Gingrich, Kristen Recine
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This work has been funded by NSF award DUE-1140440
Bucknell WWT Parallax Lab

• designed for Astro 101 (non-science undergraduates in an introductory astronomy class)
• blends hands-on and virtual activities.
• Students explore parallax as it is viewed astronomically, and develop physical intuition for the concept by measuring it in real time.
Bucknell WWT Hubble Lab

• designed for Astro 101 (non-science undergraduates in an introductory astronomy class)
• blends hands-on and virtual activities.
• Students explore the universe on its largest scales and develop physical intuition for its geometry and dynamics.
Bringing the Universe to America’s Classroom

Rachel Connolly, Pegeen Wright, Jake Foster
WGBH

Patricia S. Udomprasert, Alyssa A. Goodman, Harry Houghton
Harvard University

This work has been funded by NASA award No. NNX16AD71A
Year 1: Needs Assessment

Market Survey
80,000 K-12 Science teachers

Market Scan
K-12 Digital Media Landscape

Prototyping
National Teacher Advisor Team Classroom Testing ~1250 students

Meta-Analysis
Existing WGBH STEM evaluations on Digital Media

Years 2-5: Producing K-12 Instructional Modules

Outcomes
- Deeper, research-based understanding of how to produce digital media for STEM learning
- Optimize delivery and metrics on PBS LearningMedia platform
- Increased engagement with teacher and student audiences around authentic STEM experiences
1.86 M registered users
- 65% of all public schools
- 88% of Title I schools with enrollment greater than 1,000
- 67% of schools with bilingual education programs

2016-2017 SY Monthly Average (Sept ‘16 – May ‘17):
- 964,725 unique visitors (1M+ Jan-March)
- 1,293,988 sessions
- 3,145,933 page views
- 120,000 FREE digital learning resources
- Nearly 100% of stations have localized platform and participate in PBSLM engagement activities
EARTH MODULES

This collection brings together cutting-edge digital media—including videos, images, data visualizations, and games from NOVA’s signature programs, like NOVA and PEEP and the Big Wide World—to provide K-12 STEM teachers with high-quality resources for teaching topics in the Earth and Space Sciences. Resources in this collection are standards-aligned, and include background essays and teaching tips to support instructional use and curricular integration.

Grades K-2 | Grades 3-5 | Grades 6-8 | Grades 9-12

Land & Water

Weather

Life in the Universe

An extended learning time experience for middle school students, in partnership with the Harvard Education Portal

You are here.
Big Questions

• Could humans ever find, and communicate with, sentient life on other planets?

• Should we be looking?

• What would it mean for us if we found life elsewhere?
"Thank you so much for teaching us about the universe - there was so much I didn't know! It was one of the best experiences of my life. Thank you for this opportunity"

"We all had a great time and learned lots of new things. P.S. I'm a future scientist"

"Thank you for teaching me about astronomy and the possibility of finding life in the universe"