Communicating Science: A National Conference on Science Education and Public Outreach
ASP Conference Series, Vol. 473
J. Barnes, C. Shupla, J. G. Manning, and M. G. Gibbs, eds.

WorldWide Telescope Ambassadors: A Year 3 Update

Patricia S. Udomprasert,[1] Alyssa A. Goodman,[1] and Curtis Wong[2]

[1]*Harvard-Smithsonian Center for Astrophysics, 60 Garden St, MS 42, Cambridge, Massachusetts 02138, USA*

[2]*Microsoft Research, One Microsoft Way, Redmond, Washington 98052, USA*

Abstract. We give a brief overview of some key features of WorldWide Telescope and its Ambassadors Program, and we describe two goals for expanding the program in the coming year: scaling up training efforts; and developing "plug and play" Visualization Lab modules that teach key Earth and Space Science concepts to students while emphasizing important scientific processes and skills. We discuss several different ways that members of the astronomy education and outreach community can incorporate WWT-based materials into their work.

1. What is WorldWide Telescope and its Ambassadors Program?

The WorldWide Telescope (WWT), developed by Microsoft Research, is a powerful and beautiful astronomy visualization program that offers an unparalleled view of the world's store of online astronomical data. This free software weaves astronomical images from all wavelengths into an interface that resembles their natural context—the Sky—while offering deep opportunities to teach and learn the science behind the images. A 3-dimensional model of the Solar System and cosmos empowers students to visualize relationships between the Earth, Sun, and Moon and beyond, and to learn how their motions affect what we see in the night sky, as well as seasons we experience at different times of year. Figure 1 shows a screenshot of WWT, with some of the key features highlighted.

The WorldWide Telescope Ambassadors Program (WWTA) is an outreach initiative run by researchers at Harvard University and Microsoft Research. WWT Ambassadors are astrophysically-literate volunteers who are trained to be experts in using WWT as a teaching tool. Ambassadors and learners alike use WWT to create dynamic, interactive Tours of the Universe, which are shared in schools, public venues, and online. Ambassador-created Tours are being made freely available and will ultimately form a comprehensive learning resource for Astronomy and Astrophysics.

2. What Have WWT Ambassadors Done so Far?

From 2009–2012, we have recruited and trained several dozen Ambassadors in the Boston area who have in turn worked with over 1000 students in classrooms and about 4000 visitors to science festivals and other public events. There are also trained Am-

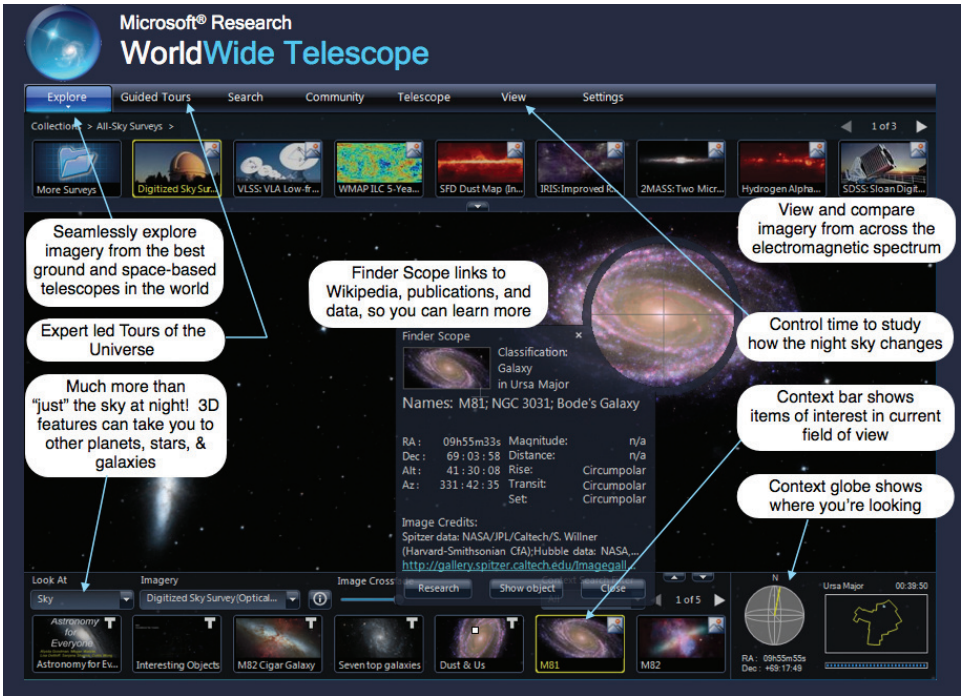

Figure 1. Annotated screenshot of WWT, showing the user interface and highlighting some key educational features of the program.

bassadors working in Washington, Texas, and Pennsylvania. Udomprasert et al. (2012) describe results from our early pilot work in schools.

Ambassadors include undergraduate astronomy or physics majors; graduate students in the astronomy program; postdoctoral fellows, faculty members; amateur astronomers; planetarium educators; and astrophysically-literate retirees.

Ambassadors have created over a dozen new interactive tours on topics ranging from Urban Legends in Astronomy to the Life Cycle of Stars. In their school-based work, Ambassadors have also helped students to create their own Tours, and we have found this tour creation to be a key learning experience for students, teachers, and Ambassadors.

3. Plans to Bring WWTA to Scale

As with all education and outreach programs, we are investigating the best paths to bringing WWTA to a broader audience. There are two main goals that we begin to address this year.

3.1. Multiple Training Paths for Educators and Ambassadors

The first goal is to reach out to new users and to provide adequate training to these large numbers of new recruits. Given the richness of the WWT program, novices find that there is a learning curve to mastering the tools in WWT. (Children tend to feel comfortable with the controls much more quickly than adults!) To date, we have been

training Ambassadors in person, at the Harvard-Smithsonian Center for Astrophysics. We have been approached by educators around the world who would like to use WWT in their outreach work, so we are beginning to pilot test remote-training methods. We are in the process of building a library of self-study materials, including guided instructions and tutorial videos, that anyone can access from our website.[1] We have also been experimenting with screen share programs such as Skype, for training teachers in a one-on-one setting. Some educators that we met at the 2011 ASP conference are some of our beta-testers this year. We will eventually expand the process to train multiple users in a single session.

We have partnered with `BetterLesson.com`, a Cambridge-based start-up company that allows teachers to share lesson plans with each other. Better Lesson is especially popular among successful charter school organizations like KIPP (Knowledge is Power Program), and we are going to begin pilot testing some of our training materials with teachers in the Better Lesson network.

Finally, we will utilize a train-the-trainer approach to reach an even broader number of educators. In particular, we plan to train Project ASTRO[2] site leaders to use WWT. They will in turn train the teacher-astronomer pairs at their sites across the country to use WWT in their classrooms.

3.2. Plug and Play "Visualization Labs" tied to Next Generation Science Standards

Our second goal is to create rich but easy-to-use curriculum materials that will be immediately relevant to teachers in classrooms around the country. To this end, we have begun the development of a series of WWT "Visualization Labs," (VizLab) designed to cover key Earth and Space Science topics in the new Framework for K–12 Science Education (Quinn et al. 2012). The labs will also emphasize several Crosscutting Concepts and Scientific Practices from the new Framework. Astronomers have to be particularly astute in their experimental design because they cannot directly interact with the objects they are studying. This makes Astronomy a particularly rich subject for teaching scientific processes and habits of mind, such as: developing and using models, constructing explanations, and engaging in argument from evidence. Once mastered, these are skills that can be transferred to all other fields, STEM or otherwise. WWT VizLabs will be designed to give students opportunities to practice these important scientific skills, without the rote repetition of canned experiments that so often turns them off to STEM.

We have developed and are currently pilot testing the first WWT VizLab on the topic of Moon Phases and Eclipses. We will develop additional modules to teach students about Seasons, Distance Scales, and Extrasolar Planet Searches, a cutting-edge research topic, which we include to reinforce the notion that science is a continuously evolving, dynamic body of knowledge. As of 2007, the concept of the Earth's tilt as a cause for seasons, and Moon phases were required by 46 states, so the first two modules will be directly relevant to most teachers across the U.S. Eclipses were required by twenty-eight states, and distance scales in the Universe were required by 15–19 states (Palen & Proctor 2006).

---

[1] `http://wwtambassadors.org`

[2] `http://www.astrosociety.org/edu/astro/project_astro.html`

Ned Ladd at Bucknell University is leading an initiative to develop WWT-based labs for general-education astronomy courses at the college level.

4. Become an Ambassador!

We especially encourage the following groups of people to stay in touch with us about training to become a WWT Ambassador:

- **Classroom Educators**, and those who provide professional development to teachers, can learn how to integrate WWT-based lessons into classrooms.
- **Planetarium and Museum Educators** can learn how to easily author new shows and content using WWT's Tour interface, and share them with WWT users worldwide. A WWT-powered digital planetarium can be built for a fraction of the cost of a commercial digital planetarium, with a resolution of 8 million pixels.
- **EPO Staff for Telescopes and Space Missions** can learn to create interactive WWT Tours that teach the public about their group's work. Beautiful imagery can be viewed in proper context in WWT—in the right position on the night sky, and in relation to views at other wavelengths.

Contact the author at `pudompra@cfa.harvard.edu` for more information.

Acknowledgments. The WWTA team would like to thank Microsoft Research for funding the WWTA pilot project, and the National Science Foundation for funding the Moon Phases Visualization Lab Pilot and the Gen Ed Astronomy Labs at Bucknell. We are grateful to all our volunteer Ambassadors who share their expertise and passion for astronomy with the public.

References

Palen, S., & Proctor, A. 2006, Astronomy Education Review, 5, 010000

Quinn, H. R., & the Committee on a Conceptual Framework for New K–12 Science Education Standards 2012, A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (Washington, D.C.: The National Academies Press)

Udomprasert, P. S., Goodman, A. A., & Wong, C. 2012, in Connecting People to Science: A National Conference on Science Education and Public Outreach, edited by J. B. Jensen, J. G. Manning, M. G. Gibbs, & D. Daou, vol. 457 of Astronomical Society of the Pacific Conference Series, 149