WorldWide Telescope in the Classroom

Patricia Udomprasert, Alyssa Goodman, Mary Becker, Erin Braswell
Harvard-Smithsonian Center for Astrophysics
WorldWide Telescope in the Classroom

Patricia Udomprasert, Alyssa Goodman, Mary Becker, Erin Braswell
Harvard-Smithsonian Center for Astrophysics

Curtis Wong & Jonathan Fay
Microsoft Research
WorldWide Telescope in the Classroom

Spring 2012 Update
Submitted by patudom on May 9

WWT Ambassadors have had a busy and productive spring! We demoed WWT at the USA Science and Engineering Festival and two local science festival events in Cambridge to engaged and enthusiastic crowds of close to 2000 people. The most common refrain we heard was, "Really? I can download this at home for free?" Ambassadors continue to be impressed by the astute questions and observations made by children who are given the opportunity to explore our universe for the first time. “Why is Pluto’s orbit so out of whack from all the other planets?” “Why does Jupiter have so many more moons than other planets?” “How long would it take for us to travel far enough outside the Milky Way to take a picture of it?”

Patricia Udomprasert, Alyssa Goodman, Mary Becker, Erin Braswell
Harvard-Smithsonian Center for Astrophysics

Curtis Wong & Jonathan Fay
Microsoft Research
Gains in Student Interest and Understanding
(“Traditional Way” vs “WWT Way”)

**Group B (Traditional)**
\[N_{before}=77; N_{after}=75\]
- What is your level of interest in Astronomy?
- What is your level of interest in Science?
- How much **factual knowledge** do you have about astronomy?
- How much **understanding** do you have about topics in astronomy?
- How well can you **visualize** Sun-Earth-Moon relationships?
- How interested are you in using a real **telescope**?

**Group A (With WWT)**
\[N_{before}=75; N_{after}=81\]

**Effect Size**: Gain (or Loss) in Units of Pre-Test Standard Deviation
(Error bars show ± 1 Standard Error of the Mean)
Gains in Student Interest and Understanding
(“Traditional Way” vs “WWT Way”)

“Cooler than ‘Call of Duty’”

Effect Size: Gain (or Loss) in Units of Pre-Test Standard Deviation
(Error bars show ± 1 Standard Error of the Mean)
“I never knew programs like this could even exist. It’s just amazing.”
– Middle School 6th grade student

More quotes from 6th Graders

“It gave me a better mental map of the universe.”

“Awesome, amazing, cool, incredible (repeat 30 times)”

“Learning about our Universe by actually seeing and exploring it makes it easier to contemplate and more fun.”

“You can explore the Universe yourself and you don't always have to only learn from the teacher.”
WWT vs Simple 2D simulator
(both in conjunction with styrofoam ball/lamp model)
WWT vs Simple 2D simulator
(both in conjunction with styrofoam ball/lamp model)
WWT vs Simple 2D simulator
(both in conjunction with styrofoam ball/lamp model)
WWT vs Simple 2D simulator
(both in conjunction with styrofoam ball/lamp model)
Phase 1: Learning Comparison

**WWT** vs **Textbook Simulator**
(both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT</strong> (N=39)</td>
<td>2.7 (1.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Textbook Simulator</strong> (N=38)</td>
<td>2.6 (1.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Phase 1: Learning Comparison

**WWT** vs Textbook Simulator
(both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT</strong> (N=39)</td>
<td>2.7 (1.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Textbook Simulator</strong> (N=38)</td>
<td>2.6 (1.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Astronomy and Space Science Concept Inventory (Sadler et al 2009)
Phase 1: Learning Comparison

**WWT vs Textbook Simulator**
(both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT</strong> (N=39)</td>
<td>2.7 (1.2)</td>
<td>5.1 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Textbook Simulator</strong> (N=38)</td>
<td>2.6 (1.2)</td>
<td>4.3 (1.4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Astronomy and Space Science Concept Inventory (Sadler et al 2009)
### Phase 1: Learning Comparison

**WWT vs Textbook Simulator**  
(both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT (N=39)</strong></td>
<td>2.7 (1.2)</td>
<td>5.1 (1.3)</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td><strong>Textbook Simulator (N=38)</strong></td>
<td>2.6 (1.2)</td>
<td>4.3 (1.4)</td>
<td>1.7</td>
<td></td>
</tr>
</tbody>
</table>

**Astronomy and Space Science Concept Inventory**  
(Sadler et al 2009)
## Phase 1: Learning Comparison

### WWT vs Textbook Simulator
(both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT</strong> (N=39)</td>
<td>2.7 (1.2)</td>
<td>5.1 (1.3)</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Textbook Simulator</strong> (N=38)</td>
<td>2.6 (1.2)</td>
<td>4.3 (1.4)</td>
<td>1.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*Astronomy and Space Science Concept Inventory (Sadler et al 2009)*
Phase 1: Learning Comparison

**WWT vs Textbook Simulator** (both with styrofoam/lamp model)

<table>
<thead>
<tr>
<th></th>
<th>Avg Pretest score out of 7 (stdev)</th>
<th>Avg Posttest score out of 7 (stdev)</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WWT</strong> (N=39)</td>
<td>2.7 (1.2)</td>
<td>5.1 (1.3)</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Textbook Simulator</strong> (N=38)</td>
<td>2.6 (1.2)</td>
<td>4.3 (1.4)</td>
<td>1.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Astronomy and Space Science Concept Inventory (Sadler et al. 2009)

These students continued to explore WWT independently!
Find out more about using WWT in your classroom.

or

Email pudompra@cfa.harvard.edu

This work has been funded by Microsoft Research and NSF award IIS-1254535