Comparing the Educational Effectiveness of Real and Virtual Geosciences Lab Exercises

Kathy Jackson
Faculty Programs Researcher
kathyjackson@psu.edu

Chris Stubbs
Manager, Emerging Technologies
stubbs@psu.edu
Our Hypothesis

Students who experience the virtual field trip (VFT) will:

• perform as well on the lab assignment as the actual field trip (AFT)
• have positive perceptions about the VFT
How to Make a VR Lab
<table>
<thead>
<tr>
<th>Grain size</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gravel</em> &gt; 2 mm</td>
<td><img src="image1.png" alt="Image of gravel" /></td>
</tr>
<tr>
<td>Pebbles 4–64 mm</td>
<td><img src="image2.png" alt="Image of pebbles" /></td>
</tr>
<tr>
<td>Granules 2–4 mm</td>
<td><img src="image3.png" alt="Image of granules" /></td>
</tr>
<tr>
<td>Coarse sand 0.5–2 mm</td>
<td><img src="image4.png" alt="Image of coarse sand" /></td>
</tr>
<tr>
<td>Medium sand 0.25–0.5 mm</td>
<td><img src="image5.png" alt="Image of medium sand" /></td>
</tr>
<tr>
<td>Fine sand 0.06–0.25 mm</td>
<td><img src="image6.png" alt="Image of fine sand" /></td>
</tr>
<tr>
<td>Silt 0.004–0.06 mm</td>
<td><img src="image7.png" alt="Image of silt" /></td>
</tr>
<tr>
<td>Clay &lt; 0.004 mm</td>
<td><img src="image8.png" alt="Image of clay" /></td>
</tr>
</tbody>
</table>
The Experiment and Findings
VFT participants performed **significantly better** on the lab assignment

(t = 2.13, df = 32.25, p < 0.05)
Female VFT participants performed significantly better than their AFT counterparts
\( (t = -2.38, \text{df} = 8, p < 0.05) \)

Male participants
- VFT and AFT no evidence of statistically significant difference per condition
VFT participants believed they learned more
(t = -2.43, df = 30.34, p < 0.05)
VFT participants were more likely to want to repeat the experience
(t = 3.20, df = 34.63, p < 0.01)
VFT participants enjoyed field trip more significantly
(t = -3.2992, df = 31.908, p < 0.00239)

Four correlated questions
• I enjoyed the field trip
• I learned a lot from the field trip
• Given the possibility, I would do the field trip again
• I would like to see more use of such field trips in university settings
But... why do this at all?
thank you!

we look forward to questions and future collaborations!

Alex Klippel
Peter LaFemina
Ryan Wetzel
Jiayan Zhao
Jiawei Huang
Jason Boettger
Jordan Blair

Kathy Jackson
kathyjackson@psu.edu

Chris Stubbs
stubbs@psu.edu