3D virtual geology field trips: opportunities and limitations

Conference or Workshop Item

How to cite:
Argles, Tom; Richardson, Brian; Davies, Sarah; Minocha, Shailey and Braithwaite, Nick (2013). 3D virtual geology field trips: opportunities and limitations. In: HEA STEM: Annual Learning and Teaching Conference 2013: Where practice and pedagogy meet, 17-18 Apr 2013, Birmingham.

For guidance on citations see FAQs.

© 2013 Not known

Version: Version of Record

Link(s) to article on publisher’s website:
http://www.heacademy.ac.uk/events/detail/2012/17_18_Apr_HEA_STEM_2013_Conf_Bham

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online’s data policy on reuse of materials please consult the policies page.
3D Virtual Geology Field Trip

Tom Argles, Brian Richardson, Sarah-Jane Davies, Shailey Minocha and Nick Braithwaite

Setting the scene

• Welcome
• Introductions (project team)
• Wolfson Open Science Lab (portal)
• 3D virtual Geology trip App (background)
  – real field trips + DVD
  – Second Life experiences
Second Life: a ‘social’ world

• an immersive experience
• sense of space
• sense of presence, co-presence
• spatial perception of sounds
• feeling of ‘flow’ and sense of engagement
• collaborative and contextual learning

Novel features of the 3D App

• 3D virtual Geology trip App
  – developed in Unity 3D
  – non-realism (e.g. drape maps over the terrain)
  – realism (design/representation), pedagogy
Site Model

Workshop plan

- Plan for the workshop
  - Demo and 5 minutes discussion
  - Opportunities and limitations (15 + 5)
  - Challenges (15 + 5)
  - Parking lot
<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual histology microscope</td>
<td>An introduction to technology with 2D images of human tissue.</td>
</tr>
<tr>
<td>File-beam table</td>
<td>Investigate electron transfer and its scope of the Lennard-Jones and Yukawa forces</td>
</tr>
<tr>
<td>Radio Telescope</td>
<td>Receive radio signals from other world civilizations and hydrogen in the Milky Way</td>
</tr>
<tr>
<td>Remote observation: Mars</td>
<td>Activity to identify potential landing sites on Mars and the search for life on Mars</td>
</tr>
<tr>
<td>Flame Test</td>
<td>A simple flame test demonstration that uses using compounds and a lamp.</td>
</tr>
<tr>
<td>Not available online</td>
<td></td>
</tr>
</tbody>
</table>

**Flame Test**

A simple flame test demonstration with 1 training compound and 1 unknown. After entering the activity, turn on the gas, pick up the lighter, light the flame and open the air hole, after that you are on your own.

15 APRIL: NB! YOU MAY NEED TO RELOAD THE PAGE IMMEDIATELY AFTER FIRST CLICKING ON THE ABOVE IMAGE TO PROGRESS THE FULL LOADING OF THE LINK. THIS IS A KNOWN TEMPORARY BUG.
Geology fieldwork in a 3D environment

- authentic and interactive 3D simulations
- realism and high degree of fidelity
- virtual embodiment in the form of avatars
- visual and spatial experience not constrained by a ‘flat’ 2D user interface
- helps internalise the sense of exploration
- real-time interaction and collaboration
Opportunities for students and educators

- practice for and reflect upon real life field trips
- learn by self-exploration and in teams
- seeing and doing what you can’t in the real world
- cutaways into a mountainside to see the geology beneath
- flying across the landscape
- explore, observe and gather data within a context, e.g. using a virtual microscope

Kit Selection

Mandatory

- Hiking boots
- Hand lens
- Grain-size chart

Optional

- Waterproof clothing
- Sun hat
- Sunscreen
- Sunglasses
- Compass

'What other items would you choose to take on a real field excursion, and why? List them at the front of your notebook.'
Sense of being there

Interactions in the space
Head-up Display

Navigation while walking
Navigation while flying

Site 1 interactions
Navigation to different sites

Toolbox for settings
Show Sketch points

Show Rocks
Pick up rock

Ability to pick up "hand samples". Hand sample will appear large scale, mid screen, and user will be able to view hand sample at higher level of detail and rotate/zoom – equivalent effect to a hand lens.

From a hand sample link to the Virtual Microscope by URL to browser

See Geology view
See Metamorphic view

Bring up slice
Arrive Site 2

Site Model

LIDAR Model
Photogrammetry data

“Artistic” blending in to terrain model

Terrain features (trees, walls, etc.) – all detailed, vegetation level