A 3D Virtual Geology Field Trip in Unity

Authors: Shailey Minocha, Tom Argles, Brian Richardson and David Burden
The Open University and Daden
Presentation by: Dr Shailey Minocha
email: shailey.minocha@open.ac.uk
Second Life: Shailey Garfield

Being in Second Life

- enjoyable
- sense of presence, co-presence
- sense of engagement
- collaborative learning
- contextual learning
Projects in Second Life

• socialisation
• team working in distributed teams
• design of 3D learning spaces
• navigation and wayfinding in 3D learning spaces

Institutional perspective

• software not owned by us
• control
• availability
• not perceived for education alone
Funding came through but…

- 3D environments was perceived as being only for demo
- Successfully pursued that there should be a full working App
- Compared: Unity 3D, Open Sim, Second Life
- Chose virtual Geology trip as the candidate App

3D Virtual Geology Fieldtrip

- will help demonstrate interactivity, sense of being there
- realism and high degree of fidelity
- visual and spatial experience not constrained by a ‘flat’ 2D user interface
- helps internalise the sense of exploration
Background

- Real field trips two or three times a year (tutor-led)
- DVD to facilitate reflection and activities
- DVD also helpful for students who are unable to go for real field trips

Lake District in the UK

- Skiddaw field area
- 6 sites (site 1 in Phase 1 of the project)
- Skiddaw group of rocks: sandstone, slates, granite
  - how metamorphism varies in the Skiddaw group sedimentary rocks due to the intrusion of the Skiddaw granite
- how the Skiddaw Group rocks deformed during the mountain-building event
Video Part 1 (what to look for?)

- Audio and textual guidance (tutor-led)
  - introduction
  - Geology of the area
  - instructions for learning activities
- Choice of avatars
- Choosing equipment for the field trip
- Task list
- Using the compass and sketching
  - [http://www.youtube.com/watch?v=5_h4Nl3AvCY](http://www.youtube.com/watch?v=5_h4Nl3AvCY)

3D Virtual Geology Field Trip App

- Realism
  - design of the environment or landscape
    - LIDaR data
    - Photogrammetry data
    - 3D modeling to weave it together
  - learning activities (similar to a real field trip)
    - choosing the equipment, sketching rocks
Video Part 2 (what to look for?)

• student investigate grain composition of one rock
• overlaying maps on the landscape
  – ordnance survey map
  – Geology map
• cross-section of the mountains
  – showing the rocks (geology) underneath
• different views in each of the contexts
  – overhead, North-East, North-West, etc.
  http://www.youtube.com/watch?v=MOdu5jQukUk

3D Virtual Geology Field Trip App

• Non-realism (things you can’t do in a real field trip)
  – microscopic views of rocks within the environment
  – draping maps on the landscape
  – cutaways into the mountainside to see the geology underneath
Opportunities for students and educators

- practice/training for real life field trips
- reflect on your experiences of real field trips
- fly across the landscape
- additional field trip to real field trip
- replace a real field trip if resources are limited

Limitations: students learning and experiences

- risk awareness skills
- challenges of being outdoors
- challenges posed by the weather
- challenges of using the equipment in real life
- bonding with other students
Challenges of 3D virtual field trips

• costs involved
• multi-skilled team and specialist developers are required
• student training
• overcoming the (negative) perceptions that people have about virtual field trips
• how best to communicate that virtual field trips are not being proposed to replace real field trips

Web links

• Daden: http://www.daden.co.uk
• The Open Science Laboratory:
  http://www.open.ac.uk/researchprojects/open-science/
• Virtual Skiddaw 3D Geology Field Trip
  https://learn5.open.ac.uk/course/format/sciencelab/section.php?name=skiddaw_1