Using Virtual Worlds in Geoscience Teaching

Jacqueline Houghton¹, Annabeth Robinson², Clare Gordon¹, Geoff Lloyd¹ and Dan Morgan¹.
¹ University of Leeds, ² Leeds College of Arts.
- Introduction
- Geology Mapping in a Virtual World
- Results
- Accessibility Benefits
- 3D Visualisation in a Virtual World
- Future Plans
Introduction

- Collaboration between School of Earth and Environment and Leeds College of Art
- Uses the *Unity™* game engine to create a virtual training environment which allows training in, and reinforcement of, mapping skills in the classroom.

- [http://www.see.leeds.ac.uk/virtual_worlds/demo/](http://www.see.leeds.ac.uk/virtual_worlds/demo/)
Geological Mapping in a Virtual World

- Virtual landscape populated with ‘outcrops’ with ‘notebook’ entries giving information on the rocks.
- Students plot these on a real field slip then decide which outcrop to visit next, exercising the same decision-making skills as required in the field.
- Create a geological map and cross sections.
Geological Mapping in a Virtual World

- Designed as an in-class exercise with paper field slip and notebook
- Replicate aspects of the mapping experience - *not a fieldwork replacement!*
- Does not teach observational skills
Virtual Training Environment

GEOLOGICAL MAPPING & FIELD SKILLS

LEEDS COLLEGE OF ART\n
UNIVERSITY OF LEEDS
Geological Mapping in a Virtual World

Skills Training

- Using grid references
- Plotting outcrops and readings on a field slip
- Interpret data and decision making skills
- Thinking in 3D
- Constructing a geological map, cross section and stratigraphic column
Results

- Easier to focus on learning the skills in a classroom than in the field.
- Made the same mistakes they make when learning in the field.
- Saved time in the field as skills already learnt.
- Increased student confidence in the field.
- Positive feedback from staff and students.
Accessibility Benefits

- Create alternative field trips for students with health/mobility issues.
- Hand specimens and thin sections, photographs.
- Assessment: Field report, map, cross section etc.
- More closely matches learning outcomes.
'Hybrid Field Trips'.

- Recreate specific localities for students who can attend field trip but not reach every outcrop.
- Allows student to experience field trip, contribute to group work and participate in the social aspects of field work!
3D Visualisation

- 3D visualisation and 3D/2D relationships are concepts many students struggle with.
- Virtual Worlds help student’s bridge the gap between 2D and 3D thinking.
3D Visualisation
3D Visualisation
3D Visualisation

- To understand and interpret a geological map it is necessary to be able to visualize the 2D map in 3D
3D Visualisation
Beyond Geosciences?

- Example of 3D Unity used in science context.
- Evidence of a game successfully used in a blended learning situation.
- The principle can be used for other visual-spatial style exercises.
- Taking Geosciences/Geography into schools.
Future Plans

- Use real places.
- More alternative and hybrid field trips.
- Consortium with other Universities/organisations.
- Site investigation type fieldwork.
- Other subjects.
- Pedagogic research.
- Get funding!
Summary

- Game-based training environment.
- Learn basic field skills before going into the field.
- Develop 3D visualisation skills.
- Field skills training to those unable to access the field.

Results:
- Increased confidence in field skills.
- Time saved in the field.
- Improved performance.
Questions ....

j.houghton@leeds.ac.uk
Project Lead

annabeth.robinson@leeds-art.ac.uk
Serious Game Design