Role of Virtual Reality in Geography and Science Fieldwork Education

Shailey Minocha

25 April 2018

Twitter: @ShaileyMinocha @OpenUniversity
3D virtual environments and virtual reality

- Second Life
- Virtual Skiddaw: 3D Virtual geology Field Trip (Unity 3D)
- 360-degree videos in the browser and via the virtual reality viewer
- Google Expeditions app: 360-degree photospheres
Preparing for the real world - geology field trip
Video: Virtual Skiddaw - virtual geology field trip

Videos are at:
https://www.youtube.com/watch?v=5_h4NI3AvCY and
https://www.youtube.com/watch?v=MOdu5jQukUk
Google Expeditions kit

Tablet + Smartphone + Cardboard Viewer + Router = Google Expeditions App

Knowledge Exchange Seminar Series (KESS)
Virtual field trips

The Great Barrier Reef during a bleaching event

Borneo Rainforest – mangroves on salty land

Chernobyl

International Space Station
Virtual reality for fieldwork education

An inquiry process

**Focus**: Geography and Science education
Geographical or scientific inquiry

1. creating a need to know
2. questioning
3. collecting data
4. making sense of the data
5. reflecting on learning
Empirical research

School-lessons
- science (n=14)
- geography (n=10)
- students (n=549)
- year 4 to year 11

Interviews
- science teachers (n=11)
- geography teachers (n=9)
- curriculum experts (n=6)

Workshops
- field workers (n=19)
- educators (n=55)

Class preparation

Inquiry-based learning activity sheet

Tropical Rainforests

Activity: After you have looked at the Tropical Rainforests in Virtual Reality, please write down questions you have about the characteristics of Tropical Rainforests.

- Why are certain plants found in rainforests?
- Could some trees evolve and adapt to have transparent leaves so other plants get more sunlight?
- How do some plants adapt so well and others don’t?

Knowledge Exchange Seminar Series (KESS)
Higher-order question:
“Can the colour of the coral before it’s been drained come back?” (Year 8, Geography, Climate Change and The Great Barrier Reef Expeditions)

Teacher’s comment:
“You’d need to explain why, the fact that it was variable on the coral. It links to the idea of resilience” (Geography teacher)

Higher-order question:
“How did the mangrove leaves adapt to take in the salt?” (Year 10, Geography, Borneo: Plant Adaptations Expedition)

Teacher’s comment:
“That’s really interesting because they’re asking why now. They know they do, now they want to know how” (Geography teacher)
Familiarisation with locations:
Allow students to plan ahead for how long it will take them to access the site and to carry out the physical measurements.
It helped me to understand the Chilterns is an area of natural beauty compared to some places in the world. It helped me to feel more caring about the Chilterns.
We did go on a little tour of the graveyard to look at how rocks are being used in the churchyard and in the church, so GE is going to be taking you to places where I can’t actually take you because it’s too far and it’s too expensive.
Affordances of Google Expeditions

360-degree visual authenticity
360-degree navigation
3D view
Emphasis and In-situ contextual information

First-person perspective
Near view
Single-user handling
Synthesis
Adoption barriers

Virtual reality in education

- Parents’ views
- Health concerns
- Costs
- Training CPD educator
- Ethical issues
Recommendations

Role of virtual reality-based field trips in the curricula

- fieldwork education (educators and students)
- environmental education
- other disciplines: ecology, history, archaeology
- cross-disciplinary interactions
- initial stimulation for inquiry-based learning
- further and higher education

Professional development of educators

- integrating technology in curricula
- evaluation of technology-based innovations
Further information

Project website:  
http://www.shaileyminocha.info/google-expeditions/; has links to blog-posts

Publications and presentations:  
http://oro.open.ac.uk/view/person/sm577.html

email address:  
shailey.minocha@open.ac.uk

Twitter:  
@ShaileyMinocha; @OpenUniversity
Knowledge Exchange Seminar Series (KESS)

...is a forum that encourages debate on a wide range of research findings, with the overall aim of promoting evidence-based policy and law-making within Northern Ireland