"Access Anglesey": An Inclusive and Accessible Field Class

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Abstract:
The "Access Anglesey" field trip ran 2nd-9th September, 2018. It was designed to investigate methods and techniques to assist inclusion and accessibility in the field. 26 participants came from round the UK. We used tablets, a live feed system via a local area network, walkie talkies and a tour guide system in the field. Less mobile students used a 4x4 vehicle, which allowed them to visit many of the outcrops. Simple interventions, such as detailed itineraries for each day and alternative exercises for those in the 4x4, worked well. The tour guide system was a particularly successful means of communication for everyone.

Introduction:
The "Access Anglesey" field class is part of the "Embedding and Sustaining Inclusive Practices in STEM" project funded by the Higher Education Funding Council for England (now Office for Students). It is a case study, by the University of Leeds, to look at which methods and techniques assist inclusion and accessibility in the field, and to develop and share good practice. The trip, which ran 2nd-9th September, 2018, was open to any undergraduate student studying a geology (or related) degree at a UK university, including those for whom fieldwork was a challenge due to mental health, learning, sensory or mobility conditions. It was also open to observers from other institutions.

Geology:
The Island of Anglesey was chosen as the location for the field class because of its excellent and relatively accessible geology (figure 1). The island's geology history extends from Pre-Cambrian and Cambrian ocean ridge pillow lavas (figure 2) and subduction-related blueschists and melange, through Silurian volcanogenic massive sulphide deposits at Parys Mountain, to Devonian desert sandstones and Carboniferous sequences of marine to terrestrial sediments (more information on the geology can be found at https://accessanglesey.leeds.ac.uk/home/the-geology/)

Participants:
The field class was advertised via University Geoscience UK, the Geological Society of London and via various websites and networks. On the trip were six students who identified as having a disability (four neuro-diverse students, one full-time and one part-time wheelchair users), seven students who did not identify as having a disability (three of these students did not have English as a first language), three observers from other institutions and eight staff (including two researchers, two demonstrators and two technical support staff).

Practicalities:
We stayed at Outdoor Alternative hostel at Rhoscolyn. The trip was fully catered by the hostel to avoid the practical difficulties of everyone trying to buy and cook their own food. We set aside one room as a designated "quiet room", where students were able to go to get away from everyone and unwind. Given the accommodation was in dormitories, this was particularly important for the neuro-diverse students.

We had self-hire vans as the road to the accommodation as well as to some of the localities were too narrow for normal coaches. We also took a 4x4 vehicle for use by the wheelchair users. Where appropriate we had permission from landowners to drive on their land; this included the beaches at Red Wharf Bay and Llanddwyn Island (Newborough Forest Nature Reserve), Parys Mountain and the headland at Rhoscolyn.

Pre-Trip

We Skyped with most of the student participants prior to the trip to find out what their expectations were for the trip, what their experiences were of previous trips and what had worked and not worked for them on any previous field classes. One of the participants had no previous fieldwork experience, for the others their experiences were mixed, but often involved being unable to participate fully in trips due to mobility issues or fatigue from the extra effort of dealing with their conditions added to the rigours of fieldwork. The autistic students explained they needed to know what was happening during the day as uncertainty increased their anxiety. It quickly became apparent that having a detailed outline of the activities for each day was important for participants to manage their energy levels as well as giving a sense of control over what was happening. Another issue highlighted was the difficulty in both hearing and understanding instructions in the field. As a result of these we produced detailed handbooks for each day with a front page showing localities in space and geological time and a clear itinerary (figure 3).

Accessibility and Inclusion in the field:

We worked on the basis that we would not be able to get every student to every locality; our aim was to include every student in the experience of every locality. For our findings to be meaningful to the wider community we wanted the trip to reflect the realities of a "normal" field trip and so localities were chosen for their contribution to the geological history of the island; accessibility was a secondary consideration. Each evening we held a short de-brief session encouraging students to add their own observations and interpretations to the geological history of the island. As the work on the trip was not assessed, this also gave students the chance for feedback on the work they had done during the day.

Alternative exercises:
We knew that we would have at least two students who would not be able to get up close to each locality, and we wanted plans for the eventuality of one or more of the other students being unable to come in the field on any day, so we prepared a set of alternative exercises. These included polished hand specimens, thin sections and photomicrographs, and photographs of specific features at a locality (figure 4). We also created a virtual landscape as an alternative way to map the Rhoscolyn headland.

Virtual landscape:
The virtual landscape of Rhoscolyn was created using the computer game software Unity 3D. It was created as part of the Virtual Landscape Project that has been running for a few years at Leeds (https://www.see.leeds.ac.uk/virtual-landscapes/). It is designed to replicate the experience of mapping an area. Students are given the field slip of the area and use their notebooks to record information. They "walk" around the virtual landscape and collect information from notebooks at the outcrops. They use a GPS to locate themselves and there is a compass to help with orientation.

Tablets:
We took two iPads and two android tablets with us into the field. These were preloaded with apps we thought would be useful. These were geological or field based apps such as Theodolite on iPad and RockLogger on Android, note-taking apps such as Google Docs or Pages, and drawing apps, in particular apps which allowed the student to annotate over a photograph such as Sketch on Android. The tablets were in ruggedized cases.

Communications in the field:

Tour guide system:
To allow everyone to hear what was said in the field we hired a tour guide system. These are usually used in, for example, museums where a guide will take people round on a tour. The guide has a microphone and transmitter and the rest of the party have receivers and

headphones. The transmitter and receivers are small (about 6x4x2cm) and hung round the neck on a lanyard. The receivers have a normal jack and so any headphones can be used with them. The kit is stored in a case which charges the equipment overnight.

Walkie talkies:
Walkie talkies were used to communicate between staff, but were mainly used for communications with those in the 4x4.

Live feed system via Local Area Network (LAN):
The live feed system connected a hand held camera to iPads in the 4x4 via a LAN. The equipment for this was supplied by the Open University.

What worked in the field (and what didn't):

Daily handbooks:
The itineraries for each day worked well. We found only 30-45 minutes was sufficient for lunch, with time to eat and to unwind. Time keeping often slipped, as it is difficult to estimate exactly how long a locality will take, but the participants found knowing the general plan helped. The handouts were printed on A4 paper and stapled in the corner, which is our usual method. After a few days, we asked the students how useful they found these. They said, whilst they looked at them the evening before, they were then put in bags to protect them from the weather and forgotten about! In the future, we will look at smaller, laminated versions.

Alternative exercises
The alternative exercises worked well. They gave the students in the 4x4 relevant work to do in the times when they were not engaged with the rest of the group via the tour guide system, walkie talkies or live feed. The outcrop photos were used during group discussions so they were able to see what was being discussed. They also enabled the students in the 4x4 to make a unique contribution to the group. At one locality, where the outcrop was heavily covered by seaweed; they provided a more detailed rock description, from their polished hand specimen, for the entire group via a walkie talkie discussion.

Virtual landscape
Due to rain cancelling the day in the field, the virtual landscape mapping exercise of Rhoscolyn was available to everyone (figure 5). It was a popular exercise amongst all the participants. We had visited Rhoscolyn the day before to look at the main outcrops, rock types and structures so everyone had a good idea of what they were looking at and overall the virtual experience worked well.

"I found the virtual experience to be enjoyable due to being able to go at my own pace and not having to worry about abrupt changes in weather conditions, which would increase my anxiety"

Tablets
All students had the option of trying the tablets in the field (figure 6). The autistic students found the tablets very useful. It helped with lack of co-ordination; gave them confidence to write/sketch as it was easy to delete something if it was wrong and they found them less distracting as there was "nothing flapping". Other students handed them back at the end of the day saying they preferred using notebook and pencils; the tablet was just something else weighty to carry and they were concerned about breaking them. Generally, students needed to be already familiar with the tablets and apps before going in the field for them to be useful. Different apps worked for different people. It was a case of trial and error. We would

recommend testing tablets and apps out beforehand to a greater extent than we were able to do. Some apps need to be set up via a good internet connection before they will work.

Tour guide system
The tour guide system worked very well in the field (figure 7). It meant everyone could hear what was being said and did not have to worry about missing anything. It meant participants could listen to instructions without necessarily having to stop what they were doing (for example finishing off a sketch or eating a sandwich). We had trouble with the wind at the beginning but were able to acquire a windshield, which solved the problem. The windshield bore a close resemblance to a dead chinchilla and "Chinchilla Radio" became the running in-joke of the field class, to such an extent, several participants said it was their favourite memory of the trip. Using the tour guide system also meant participants did not have to get in close together to hear what was being said; an aspect of their use we had not considered and one that was appreciated by the autistic students.

"The tour guide system's been really good ... now I don't miss anything, because I can't deal with being in a crowd or…getting too close, or having to sort of, back off and go somewhere to the side on my own. I can now do all those things, but I don't miss anything".

Live feed system via LAN:
There were limitations to the use of the live feed system. These were mainly around the time it took to set up and whether the locality was suitable for its use. Ideally, it needed to be in direct line of sight and within a few hundred metres of the 4x4. However, for the localities where it did work; it worked very well indeed, providing real time footage and two way conversations between those at the outcrop and those in the vehicle.

Conclusions:
Overall, we found the simplest interventions were the best: knowing the itinerary for the day, allowed participants to plan their time and manage their energy levels; the lack of assessment meant less pressure on the students and gave them more freedom to think and come up with their own ideas rather than the "right answer"; the 4x4 used in conjunction with walkie talkies and photographs of outcrops was surprisingly effective for those unable to directly visit the outcrops, as well as simple and reliable to use; and the clear communications provided by the tour guide system was invaluable.

Acknowledgments:
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Photo credits: Clare Gordon.

Figure captions:

Figure 1: Map of the localities visited on Anglesey (Google Earth).
Figure 2: Studying the pillow lavas on Llanddwyn Island.
Figure 3: Front page of Day 2's handout, showing the day's itinerary and locations.

Figure 4: Photos of outcrops and photomicrographs from the alternative exercise handouts. These were laminated for use outdoors.
Figure 5: Virtual landscape mapping in action.
Figure 6: Student using a tablet in the “gulley” at Rhoscolyn.
Figure 7: Walking along one of the geological boundaries at Rhoscolyn. Everyone could hear the instructions, including those in the 4x4, through the tour guide system.

Figure 1:

Figure 2:

Figure 3:

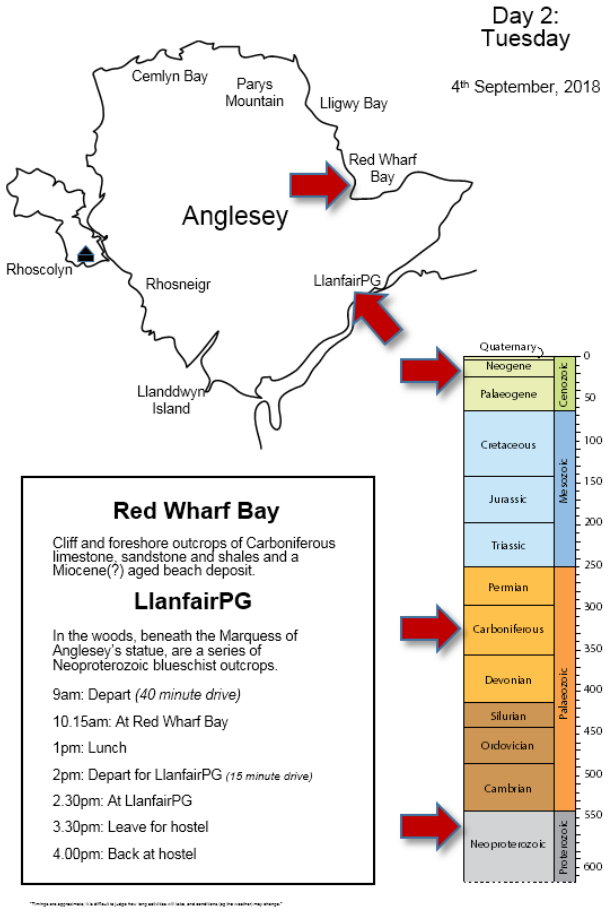

Figure 4:

Figure 5:

Figure 6:

Figure 7: