Alice Matthews

It's virtually a glacier

Alice describes two virtual fieldwork sessions on glacial landscapes in year 9 and evaluates them in relation to actual fieldwork.

This article explores how virtual fieldwork can be used to support students' understanding of glacial landscapes. This is a complex topic that involves intangible concepts in (often) inaccessible environments. The findings presented in this article are part of a larger research project that I conducted with a class of year 9 students at an all-girls school in Hertfordshire as part of my PGCE. The findings are intended to inspire and encourage teachers to experiment with virtual fieldwork as an engaging medium through which to teach challenging geographical topics.

The extent to which virtual fieldwork can replace the valuable assets central to can replace actual fieldwork is questionable. Physical geography topics in particular can involve difficult concepts that are best depicted in real life. For example, dispelling the misconceptions surrounding river velocity can best be tackled on fieldwork, when students can see the processes occurring first-hand. However, given the financial and time constraints on conducting actual fieldwork, virtual fieldwork presents an exciting alternative.

Taylor (2005, p. 157) defines virtual fieldwork as a 'representation of a specific geographical area using digital images and/or photographs/video', although virtual fieldwork is not confined to these media. For example, Fryer (2017) shares her experience of virtual fieldwork on coasts using PowerPoint as an interactive medium that allowed students to 'travel' to different sites along the Dorset coast.

Virtual fieldwork resources

Fuelled by a desire to explore creative ways to teach geography, I created two virtual fieldwork sessions using these websites: VR Glaciers and Glaciated Landscapes (VR Glaciers, 2019) and BRITICE Glacial Mapping Project: version two (BRITICEV2, 2017). These sessions aimed to give students an enriching, interactive experience that enhanced their understanding of glacial landscapes without compromising the values of real-life fieldwork. The sessions focused on glacial landscapes in the UK, exploring the glacial landforms and processes that have shaped the surrounding environment, a challenging topic for students and one that lends itself well to virtual fieldwork (McDougall, 2019).

Each session lasted one hour, and I issued students with a fieldwork booklet containing instructions and activities for them to work through during the session. Groups of two or three students worked on one computer throughout both sessions.

Prior to the sessions I taught three lessons introducing students to glacial landforms and glacial processes to ensure that they had a foundation of knowledge to build on. Before these lessons, students had very limited knowledge of glacial landscapes.

Helvellyn virtual field trip

The first session was a virtual field trip to Helvellyn in the Lake District. This was conducted using the VR Glaciers website – virtual tours of a variety of glacial landscapes, from Switzerland to the USA. The website includes images, maps and data files that provide a comprehensive assembly of resources to support each virtual tour. The tour section of each landscape is a collection of images (panoramas) accompanied by a map that locates the area shown on each image. Students are able to zoom in and out of the landscape, switch between panoramas and get a 360˚ view of each area. I selected one area, including both a corrie and an arête, for students to draw a field sketch. The session focused on giving students an 'experience' of being in a glacial environment, allowing them to visualise glacial landforms and observe evidence of the glacial processes that had carved out the landscape.

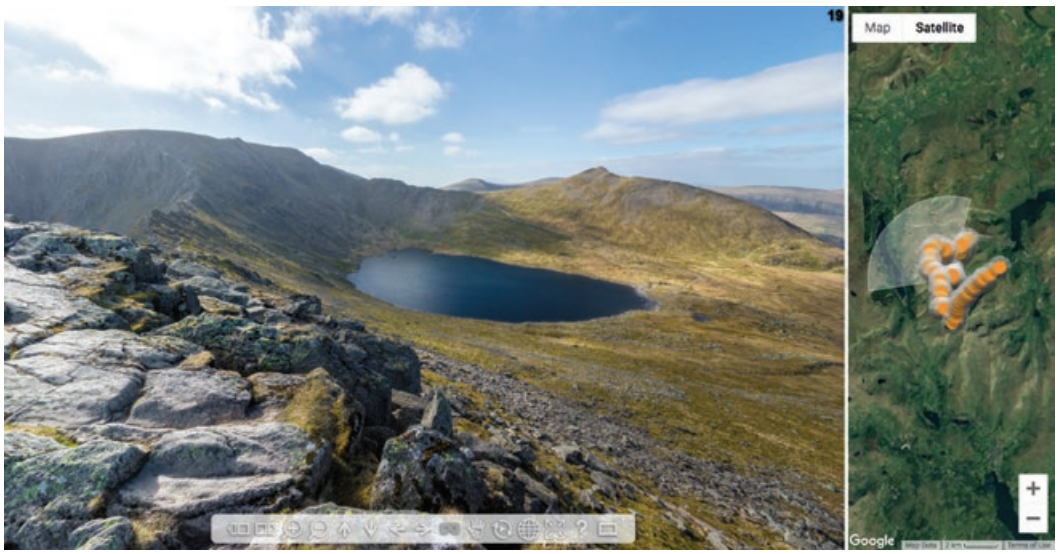

Figure 1: Panorama 19 of the Helvellyn tour, the area that students were required to field sketch. The orange dots are different locations/sites you can click on to access a panorama of that location. **Source:** VR Glaciers.

Exploring corrie size with BRITICEV2

The second session had more of a skills focus, requiring students to engage with numerical data and develop their ability to analyse it critically. Their main activity was compiling a dataset of corrie size across the UK using BRITICEV2 (2017). This is an interactive map of the UK annotated with thousands of glacial landforms from the last ice age. Each landform is accompanied by a definition and an attribute table of landform details, including its size and shape. Using the attribute table students gathered data on corrie length and width across England, Scotland and Wales (Figure 2). They calculated the mean corrie size in each country, then listed the advantages and disadvantages of their dataset in terms of determining corrie size across the UK.

To analyse students' progress in understanding, I conducted a concept mapping exercise. Whole-class questionnaires were issued at the very beginning of the lesson sequence and before and after the sessions. After the sessions I also interviewed a group of five students to assess how they felt the virtual fieldwork had helped develop their understanding of glacial landscapes.

The initial concept mapping exercise revealed that students had very limited prior knowledge of glacial landscapes, with many students writing 'I don't know anything' in their responses (Figure 3a). Following the virtual fieldwork sessions, however, students added subject-specific terminology to their concept maps; for instance, describing a corrie with 'small lake called a tarn' and describing erosion 'like scratching' (Figure 3b). This suggests that the sessions deepened students' understanding of glacial landscapes, a conclusion supported by the post-fieldwork questionnaire, in which 84 % of students either agreed or strongly agreed they were confident that they now understood what glacial landforms are, compared to just 59 % before the sessions.

Location		Corrie Name	Length (m)	Width (m)	Sketch
Scotland e.g. The Scottish Highlands	1	Loch Brandy	1,071.00	1,029.00	
	2	Toll Aiich	1123.00	1272.00	
	3	nan Breac	1397.00	880.00	
Wales e.g. Snowdonia	1	Daear Fawr	387.00	415.00	
	2	Llyn Fawr	698.00	1267.00	
	3	Cerrig y Gwaelch	822.00	1674.00	
England e.g. The Lake District	1	Yoke N	694.00	721.00	
	2	Ingleborough	477.00	926.00	
	3	Green Side	589.00	690.00	

Figure 2: Student dataset of corrie size in the UK.

Evaluation

Overall, students responded positively to both sessions, engaging with both websites with curiosity and enthusiasm. Lessons were interactive, with students working in pairs or small groups, demonstrating that virtual fieldwork does not compromise the synergetic value of actual fieldwork.

The interview following the sessions revealed that students thought the BRITICEV2 session had done more to enhance their understanding of glacial landscapes than the VR Glaciers session: the BRITICEV2 sessions contained more information, and enabled them to make comparisons between corrie size in different parts of the UK. This expanded their locational knowledge, whereas the virtual field tour focused on just one UK location. However, students enjoyed the interactive elements embedded in the VR Glaciers website, such as the ability to zoom in and out, and acknowledged that the virtual tour had helped them better understand what a glacial landform looked like, something they felt that they could not have gained from a classroom lesson.

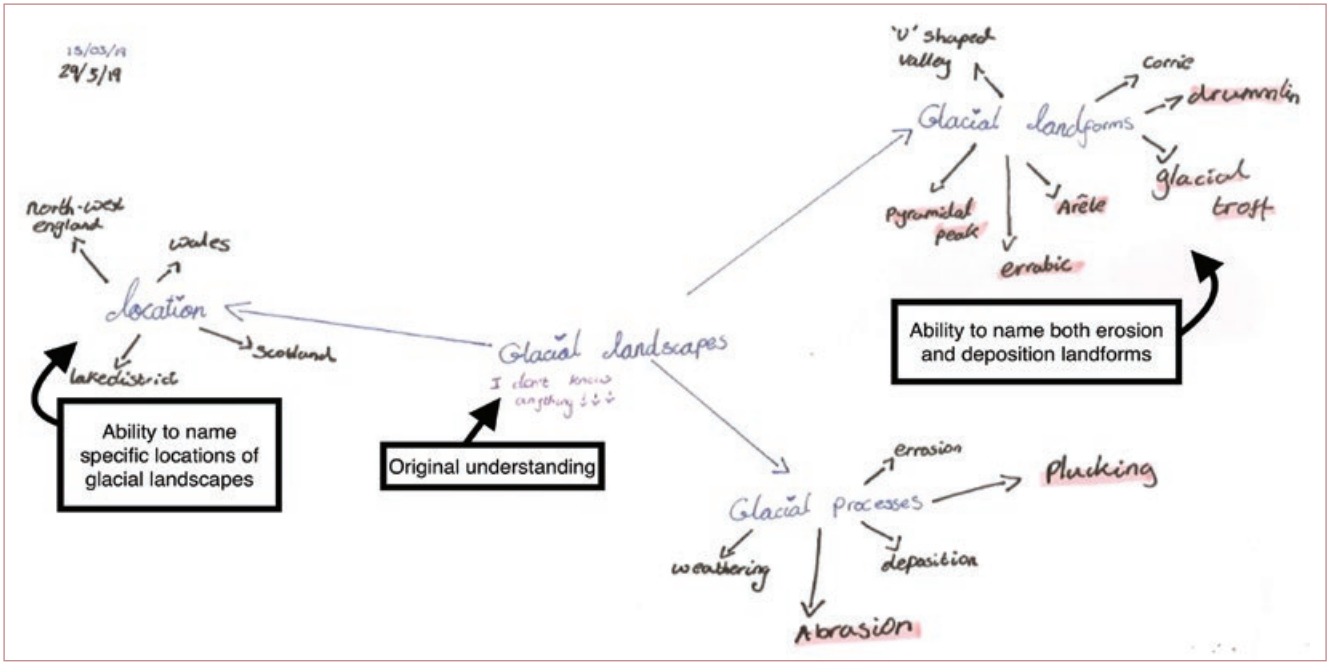

Figure 3a: Student concept map showing original understanding of glacial landscapes.

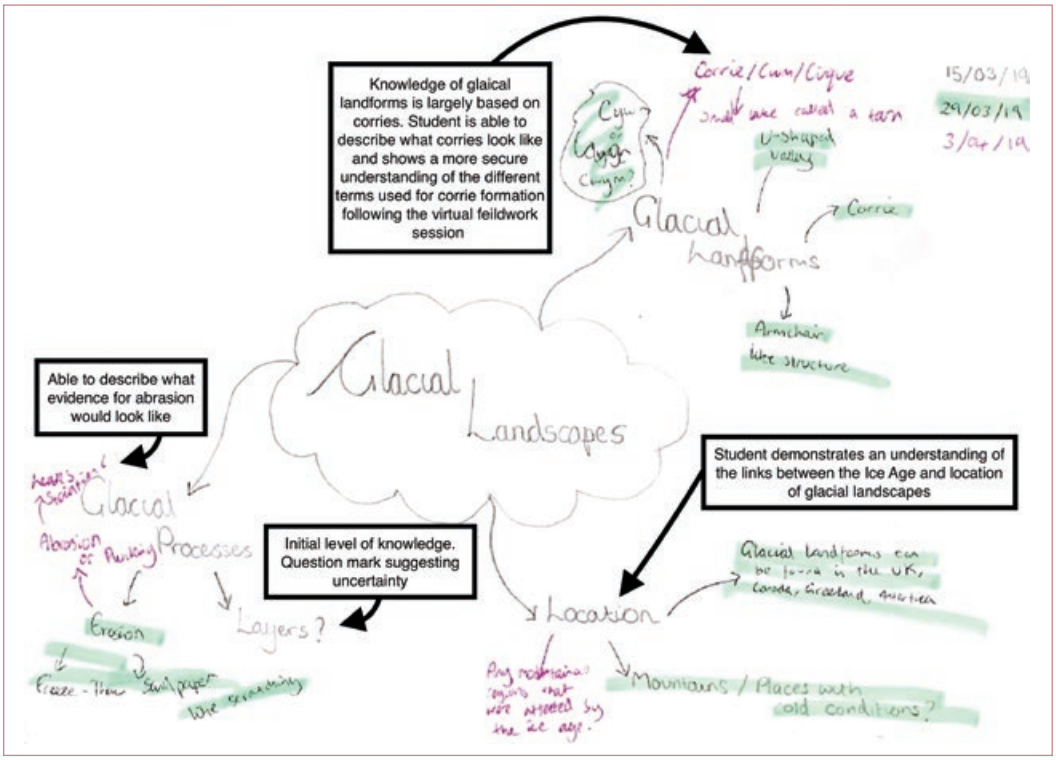

Figure 3b: Student concept map showing improved understanding of glacial landscapes.

The students who were interviewed commented on the focus on corries throughout the fieldwork sessions: although they felt they now had a strong understanding of this particular landform, they felt insecure in their understanding of other landforms. This highlights the difficulty of accessing breadth in virtual fieldwork, although this is a drawback I have also observed during an actual field trip with year 12. On the field trip, the glacial landscapes session focused on the formation of drumlins, and students spent a whole day measuring the cross-section of a drumlin in order to infer the direction of ice flow. This suggests that fieldwork as an overall domain within geography can allow students to *deepen* their understanding of a single glacial landform, but can be limited in the extent to which it *broadens* their understanding of the totality of glacial landforms.

Time constraints

No student managed to complete the fieldwork booklet in either session, suggesting that my expectations of how much content could be covered were over-ambitious. This was particularly evident in the first session: very few students managed to complete a second field sketch. Only having time to look in detail at one site may also have contributed to their limited understanding of other types of glacial landforms. Likewise, lack of time may have restricted their understanding of the skills element: some students interviewed did not reach the data analysis stage of the BRITICEV2 session. This in turn could have contributed to the conclusion that corrie size was biggest in Scotland. These time constraints support Fryer's (2017) finding that it is important to allow enough time to conduct virtual fieldwork.

Finally, supplementing the virtual field tour with a commentary about the landforms they were seeing would perhaps have reassured students that they were identifying the landforms correctly. Sources for such a commentary could include web pages (Taylor, 2005) or video clips (Fryer, 2017).

Conclusion

Overall, the findings suggest that virtual fieldwork not only enhanced students' understanding of glacial landscapes but also built vital interdisciplinary skills, such as numeracy and evaluation skills. I strongly encourage teachers to experiment with virtual fieldwork to supplement classroom-based learning. Virtual fieldwork allows students to explore environments that may be inaccessible to them. There was no evidence to suggest that the values of actual fieldwork were lost and that virtual fieldwork cannot be a useful alternative, particularly when actual fieldwork is not possible. I advocate virtual fieldwork as a fulfilling and enriching geographical experience that is both challenging and rewarding. | **TG**

Having completed a PGCE at the University of Cambridge, **Alice Matthews** is currently an NQT at an all-boys school in London.

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