Virtual Fieldwork
A case study from Spurn Point, Humberside

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Abstract
A Virtual Fieldtrip (VFT) was designed as a part of a second year compulsory module in physical geography. Film clips and photographs were taken of Spurn Point and edited so that they could be integrated into an online resource. A website was designed that allowed the students to view the images, alongside other resources, to learn about the fieldsite in a logical and progressive manner. The VFT was organised and conducted in the same way that a real fieldtrip to the site would have been. The students were very positive about the VFT citing that greater information was obtained than would have been available from a one day trip and the ability to access the VFT frequently and at their own pace were two of the strongest aspects. Although the VFT production was resource intensive, the fact that the resource can be used for many years has justified this.

Keywords
Virtual fieldtrip, design, implementation, feedback, video

Introduction
The use of Information Technology to simulate field based activities is a well-established approach to providing students with the challenges of real fieldwork while avoiding many of the logistical and financial barriers of a physical trip. (Stainfield 2000). Fieldwork is a particularly essential component of geomorphology where the subject intrinsically demands consideration and experience of physical environments. Fieldwork has the potential not only to support the development of essential student skills for the discipline such as observation and independent learning, but can also provide exciting, “real world” experiences, increasing students’ motivation and engagement with the subject (Turney 2004).

Interest in and adoption of Virtual Fieldwork is becoming more prevalent (Fletcher et al., 2002, Turney et al., 2004, Fletcher et al., 2007) driven in part by technological advances but also pressures which make arranging field trips increasingly challenging. Factors such as cost, increasing class sizes, health and safety concerns, the environmental impact of travel and visits to environmentally interesting and/or sensitive locations and the inaccessibility for some or all members, have all driven the growth of Virtual Fieldwork initiatives. However, despite the many challenges of physical fieldwork, it is still regarded as the best way for students to develop key skills in this area, with virtual activities taking a complementary role. Virtual Fieldwork uses videos, digital images and other artefacts such as maps, tables and datasets to complement as well as simulate the learning activities that occur in real life fieldwork activities. As well as the learning that occurs within the virtual experience itself, Virtual Fieldwork can play an important role in preparing students for physical site visits, ensuring that they get the most out of the real world experience and allowing them to draw and build on their earlier experiences and learning.
**Objectives and rationale**

It was planned that the Virtual Fieldwork activities within the ‘Coastal Geomorphology’ module would engage students with real world environments allowing them to study the land formation and the underlying processes at play in coastal environments. The module leader identified that, given the pressures associated with arranging a physical site visit for large numbers of students, including cost, health and safety issues and environmental impacts, that a simulated experience would provide a more “hands on” and “real” learning activity than “merely looking at photographs in textbooks or browsing the web”. It would also support the preparation for site visits by allowing students to revisit content and work through the preparatory material at their own pace. It was also recognised that Virtual Fieldwork would also allow students to experience a greater variety of landforms than would be available from a one day fieldtrip.

Against this background the Virtual Fieldwork, delivered as a “Virtual Fieldtrip” or VFT, in this module aimed to:

- Allow students to develop their understanding of the subject and make links with the theoretical content of lectures through tasks that simulated real life activities;
- Provide students with an engaging, reusable revision resource;
- Maximise student engagement with real world phenomenon while minimising the environmental impact of the module;
- Provide students with important experiences, skills and understanding that can be drawn on in later physical field trips and summative assessment, particularly the closed exam (60%);
- Inform the module leader about the students’ practical grasp and ability to apply key concepts for the module through formative test results;
- Create a reusable resource that could be deployed in future iterations of the module.

**Design, development and delivery**

A VFT was designed and produced by the module leader and delivered through the VLE in a compulsory, supported face to face session following the lecture series. The VFT consisted of a highly structured set of online resources including original images and video clips taken from the site, digital maps, external links and text explanations, illustrating the evolution and ongoing development of the location. At the end of the fieldtrip students were required to complete a formative multiple choice test and the resource remained available to the cohort throughout the year via the VLE, to allow them to recap on, or work through, the range of additional resources.

The VFT was introduced to the module after 6 lectures in the series and prior to a field visit to a different site. Positioning at this point within the module allowed the students to draw on the theoretical background provided in the lectures and prepare for the later physical visit. All students were given the opportunity to complete the VFT within a 3 hour timetabled session in a PC laboratory, allowing the instructors to highlight the rationale and links to other areas.
of the module of the activity, as well as providing support to be given at the time of need. The VFT remained accessible by the students following this event both for students who were unable to attend on the day as well as to serve as a preparatory and revision resource for subsequent fieldtrips, a compulsory formative GIS exercise and exam later in the module.

The VFT was created in three stages;

1. **Planning and design** – it was essential to plan the Virtual Fieldwork outcomes, resources, activities and integration with the rest of the module carefully before production started. This ensured that it would be aligned to the learning outcomes of the module as a whole and would inform subsequent activities such as GIS activities, on site visits and assessment. Effective planning is an essential part of any media production project and helps to ensure that data and resource collection in the next stage is both efficient and complete.

2. **Fieldwork and research** – the module leader visited the National Nature Reserve location of Spurn Point in Humberside to create the resources for the VFT. Still images and video footage were collected to illustrate the general environment as well as specific features, particular to that location such as sand dunes, erosion, mudflats etc. These original digital assets were complimented by a range of other resources sourced from various locations such as maps, illustrations and links to further reading and reference materials.

3. **Post-production and build** – with the design in place and the raw materials assembled this stage of the process saw the production of a completed online resource. Significant work was required to edit video footage and prepare it for online delivery through the VLE. In particular the poor sound quality of footage recorded on site meant that voice over narrations had to be re-recorded during this stage. The native tools within the VLE allowed for the VFT resources to be created quite easily as a series of sequential “Learning Modules” which students are guided to work through in order.

In addition to the time required to edit and produce the 21 separate video files that were included in the VFT, the size of the resource was also a significant contributing factor to the time required to produce it. The VFT consisted of 8 discrete learning units consisting of a number of sequentially presented resources, collections of supplementary links, videos, images and references and the final self-assessment test. To indicate the size of the overall resource, a screenshot of the elements comprising the overall resource and a sample outline of one of the learning units is produced below.

Figure 1: Overview of the resources assembled into the VFT
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Sample learning unit: Background and description of Spurn Point

- Map of Humber Estuary and Holderness coastline (link)
- Geology and Holocene chronology of the Holderness coastline (illustration and link)
- Overview (video)
- Northern part of SP (image)
- Devensian cliffs at north of Spurn (video)
- Morphology of Spurn Point (text and image)
- Topography of the spit (text and image)
- Old Den (text and image)
- Coastal station and the old lighthouse (video)
- Greedy gut and Stony Binks (text and illustration)
- Sedimentary structures (illustration and text)

Figure 2: Video content embedded within a sequential learning module
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Benefits of Virtual Field Trips

Although it is accepted that there are many ways in which a VFT could not truly replace a physical on site experience, there are a number of educational contexts that are very suited to or will be enhanced by this method of delivery (Jenkins & Williams, 1997, cited in Maskall & Stokes, 2008, p42). The VFT deployed in this module delivers benefits in a number of educational contexts, including:

- **Enhancement** – preparing students for residential fieldwork

- **Replacement / Extension** – allowing physically challenged students to experience remote locations or large numbers of students access to environmentally sensitive locations. Students also have greater flexibility over their learning through the ability to personalise their learning pathways by using links on the VLE for additional information.

- **Interaction** – students can access the resources at their own pace and control the playback of resources. Jenkins and Williams (1997) also point to examples in other VFTs where students are given the opportunity to interact with the Virtual Environment, allowing them to alter physical processes and observe the consequences in real time.

- **Efficiency** – staff and student time can be saved by not having to go to remote locations and students can return to the field site multiple times. In addition students often find taking good field notes, or even seeing the geographical features, in inclement weather challenging and at times impossible and a VFT overcomes these issues.

One of the most tangible benefits of the VFT over a physical site visit is the impact on the environment. Analysis by the Stockholm Environment Institute at York (Davis & Barrett, 2010) shows that in this instance the VFT produced less than 2% of greenhouses gases, saving approximately 1000kg of CO$_2$E (carbon dioxide equivalent) compared to a physical visit. It is estimated that the production and student engagement with the VFT produced 19kg of CO$_2$e compared to the 1019kg that would be produced to transport the cohort of students to the site. While these figures are very significant in their own rights the effect would be magnified greatly by visits to more distant or foreign locations compared to the relatively local 138 mile round trip used in the calculations in this instance.

Production tips

Reflecting on the experience of designing, building and delivering the VFT in this instance has led to a number of transferrable lessons learned that have both be passed on to colleagues developing similar projects and have also influenced the module leader’s own practice.

**Production timescale** – the time to plan and produce the resource took much longer than originally thought. A significant factor in this was the effort required to edit and provide voice overs for the video, some of which could be addressed in production (filming) rather than at post-production.
Effective planning – having a clear idea and explicit plan of what the finished resource will look like and contain is essential to streamline all other stages of the production process, particularly gathering any original source materials from locations. The aim of this particular VFT was to mimic as far as possible the route that would have been taken if the fieldtrip had actually been conducted. The route was shown on a map and video clips and images inserted as appropriate alongside additional data, information and references. It is important to visit the site and establish how a real fieldtrip would be conducted and then translate this knowledge to the VFT.

Use and re-use – consider upfront how the resource will integrate into the module delivery, the links with face to face teaching, formative activities and final assessment. Being explicit about the rationale and role of the resource with students will help to increase their motivation to engage.

Video production – many of the skills required were acquired on the job, often through trial and error. While this may be acceptable for video editing, it is important that the footage shot is as high quality and suitable for its intended use as possible, as opportunities to reshoot may not be practical. Getting the right kind of footage on location can also significantly help with reducing the time required in post-production by following steps such as;

- Plan in advance the shots that you need to shoot on location
- Always use a tripod
- Add audio commentary at the time of filming using a high quality external microphone. This will avoid having to add this in post-production and significantly reduce time spent on editing.
- Better control over the speed of panning shots, this is likely to get better with practice and with the use of a high quality tripod.

Impact

The impact and effectiveness of the VFT has been evaluated through analysis of student engagement with the tasks, staff interviews and a focus group with students.

The three hour computer session was attended by everyone on the module despite being optional as students were also allowed to engage with the VFT at a time to suit. This was not anticipated by the module leader but points to high levels of engagement with both the subject matter and the approach to delivery. Students also cited the VFT frequently as case study examples in the closed examination.

Student response in a focus group appeared to support this high level of engagement, noting that they found the resource informative and easy to use. However they did highlight potential ways in which the resource could be developed to make it easier to use;

- Greater guidance on using the resources provided
- Annotation of video resources
- Animations and interactive sequences illustrating many of the processes being studied (eg erosion of coastline etc.)
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The module leader and designer of the VFT felt that the VFT complemented the lectures and seminars given in the ‘Coastal Geomorphology’ module. Since it was designed four years ago it has been used successfully and with positive feedback every year and is now an integral part of a wider second year physical geography module. Student engagement has been high in every year it has run with most actually attending the timetabled three hour session. The time taken to produce the VFT included a day of filming at Spurn Point and several days of editing the film and designing the website as well as additional time taken to collect other resources, literature and references. This could be considered as costly in terms of time and labour. However, the fact that this is a reusable resource means that this can be justified. In addition, future VFTs that are planned to give the students a suite of online fieldtrips will be less costly as the software and procedure will be familiar.

Conclusions

The VFT that was developed on Spurn Point was considered a success by both students and staff. It has been presented at University Learning and Teaching conferences and has attracted interest across Departments. Students have particularly commented on the wealth of information that is stored within the VFT, more than could have been gained from a one day fieldtrip.

Staff members have described the use of Virtual Filedwork as having “huge scope” with many potential applications for teaching physical geography. It is hoped that a portfolio of field sites can be developed for flexible student access and there is the potential for inter- and cross-departmental collaborations. Once resources have been developed they can be reused as required and Virtual Fieldtrips can be arranged for large numbers of students cheaply and easily.

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