

Virtual Site as an aid to first-year learning

Ian Dickinson, Martin Green, Melanie Smith, Adrian Bown and Chris Gorse

Introduction

Courses run by the School of the Built Environment have a range of entry requirements that enable diverse students and those with lower academic qualifications to gain entry. This results in a particular challenge for the Documentation & Estimating module, which is a very practical, skills- and competence-based module. It is delivered to large tutorial cohorts of mixed courses, abilities, ages and experience. Many students need one-to-one guidance to understand what, practically, they have to do. They are given the theory first in a lecture and then have practical tutorials to carry out assessed exercises with limited tutor contact time. The module includes some basic surveying techniques and a levelling exercise which involves the transfer of a level from an assumed benchmark to establish a temporary benchmark some distance away. Many students have problems with computation of results. In spite of a careful introduction and explanation of the use of the instruments and techniques, many students find it difficult to visualise what is happening.

Virtual Site

Interactive e-learning tools are being developed to assist with the teaching and learning of key skills, principally as an aid to first-year teaching on our BSc (Hons) Building Surveying, Quantity Surveying and Civil Engineering courses. Virtual Site (www.leedsmet.ac.uk/teaching/vsite) is a project that makes use of the latest graphics software and hardware technology to create a virtual interactive construction site. A key feature of Virtual Site is the ability to link to panoramic videos and attach teaching content such as photos or video clips to particular areas of a scene.

To address the issues raised above, the module tutors decided to trial an additional, concurrent, method of delivery and learning, by placing a virtual levelling exercise on Virtual Site. This enables students to take readings of the survey stages via a series of panoramic movies and mocked-up views through the eyepiece of the level (Figure 1). After completing the exercise students can compare their readings with those that were taken during the actual survey. Students are introduced to this in

week 1 of the first semester, prior to their first practical. The tool is student-centred in that students can access it at any time throughout the duration of the module, can learn at their own pace and can use it as a refresher exercise.

Figure 1: Virtual levelling exercise



A first-year BSc (Hons) Construction Management student commented:

"You can do this as many times as you want. If you don't understand something you can go back and do it again. The tips are very useful. If I was at home with this, it has enough instructions for me to know how to read the foresights, backsights, etc, plot it onto the table and do the work without any help. It is designed well and is very realistic."

On seeing the virtual levelling exercise for the first time recently and referring to her experience as a first-year student, a final-year student said:

"I remember going to one of the tutors and falling apart because I didn't know how to do basic levelling, so this would have been really helpful. It's a brilliant tool and I think the first-year students are very lucky to have it. When you're new to it, levelling surveys can be mind-bogglingly confusing."

Another first-year student suggested that the addition of a plan view showing the different points that the surveyors are moving to at each stage of the levelling survey would give students a better understanding of the process. This suggestion is a feature that will be incorporated into a new version of the exercise.

The general feeling among colleagues and students is that the virtual levelling exercise is useful as an introduction before students do their practicals and is also useful as a revision aid. However, students on distance learning courses would not fully understand the complexities of doing a real levelling survey if they had only completed the virtual exercise. Also, online exercises cannot give the support and helpful feedback that a course tutor can.

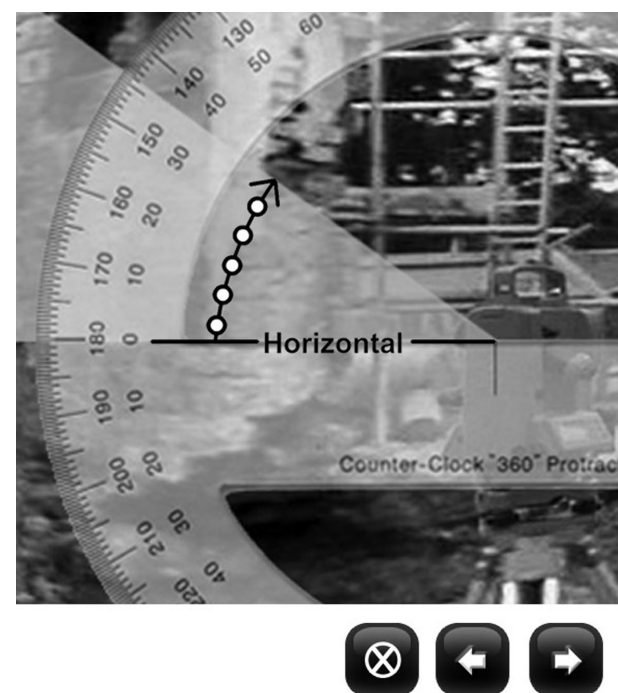
Virtual Maths

Our Civil Engineering courses require students to have a minimum standard in maths equivalent to a Grade C at GCSE level. Even with this policy, some new students still struggle with the maths content of the courses. There are a number of reasons for this, including the comparatively high level of ability expected of students from the very start of the course, mature students entering the course years after they last studied the subject at school, and, it has to be admitted, some of the arcane maths employed in Civil Engineering. Even if they have a reasonable grasp of the subject, many students still experience difficulty with some basic areas of maths such as units in calculations, the use of symbols and Greek letters in equations and the rearranging of simple formulae.

We are seeking to assist our students in their learning of maths with a new development in Virtual Site. Maths e-learning exercises in the Classroom area of the website enable students to learn at their own pace. They can be used as introductory or refresher exercises. Students who may be embarrassed to admit to a tutor that they are struggling with maths can use the exercises to catch up in private study (www.leedsmet.ac.uk/teaching/vsite/classroom).

A step-by-step approach is used to unravel complex problems. Backwards and forwards control potentially enables students to retrace steps, allowing for greater comprehension. The exercises, created with Adobe Flash, comprise a series of slides, some animations and quick quizzes to make them visually interesting and engaging to the user. To date, we have produced a volume calculation exercise, in which the student calculates the volume of concrete required to fill a void created by auger piling, and a theodolite exercise (Figure 2), in which the student calculates the height of a building by taking a series of readings and using basic trigonometry to make a final calculation. Further exercises are in development.

Figure 2: Virtual theodolite exercise



A BSc (Hons) Construction Management student commented on her use of the virtual theodolite exercise:

"I liked the height calculation exercise. It's like revision, taking you through the steps of how to do it. Having something that's easy to look at and tells you how to use your adjacent and hypotenuse and reminds you which angles are necessary, without having to find a book and look at equations [is useful]. It pops out at you and stays in your memory."

Conclusion

Findings from student survey data clearly show that students value the virtual levelling exercise (Ellis et al, 2006). Students believed that it enhanced the written guidance in the module guide and reinforced their understanding of the levelling procedure.

Leeds Met has franchised a Diploma in Higher Education in Quantity Surveying to Rushmore Business School in Mauritius. The first module of this course, Documentation & Estimating, includes a levelling exercise. The Senior Lecturer who delivered the module stated that the students greatly appreciated the virtual levelling exercise as a learning tool and commented on how it helped to clearly illustrate and consolidate what they had been doing on the practical levelling exercise. It was also evident that it had clarified the terminology used in levelling and the processes of computation of the levelling results. The increase in the students' confidence after completing the exercise on Virtual Site was obvious and the ease with which they completed the computation for assessment was also apparent. The Mauritian students were delighted to have access to Virtual Site and to be able to refer back to its features as often as they liked, not only for the levelling exercise but also for its other resources.

However, attempts to teach maths in the context of real-life situations, such as our virtual theodolite exercise, have not gone without criticism. Marcus du Sautoy recently wrote in *The Guardian*: "A study published by the thinktank Reform finds

that since the 1980s, mathematics has been dumbed down and made so anaemic that students are being put off taking it beyond the compulsory tick in the box at GCSE... An attempt to make the mathematics more 'relevant' has ended up just making it boring. The move away from rigour and logic, the bedrock of mathematics, has emasculated the subject. But it is precisely this ability to think logically that employers are so thirsty for."

The Virtual Maths team at Leeds Met will be attempting to address this criticism by developing engaging e-learning exercises in pure mathematics, in addition to the contextualised exercises. As the tools develop, greater differentiation between learning abilities should be possible.

References

Ellis, R.C.T., Dickinson, I., Green, M. & Smith, M. (2006) The Implementation and Evaluation of an Undergraduate Virtual Reality Surveying Application. Proceedings of the BEECON 2006 Built Environment Education Conference, London, 12-13 September.

du Sautoy, M. (2008) Without the big maths stories our numbers are plummeting. *The Guardian*, 3 June.

Ian Dickinson
Research Fellow

Martin Green
Senior Lecturer

Melanie Smith
Senior Lecturer

Adrian Bown
Senior Lecturer

Chris Gorse
Reader

School of the Built Environment