Student Numeracy Support Using Bespoke Reusable Learning Objects

Chrystalla Ferrier

Faculty of Science and Technology

This is an electronic version of a poster presented at the CETL-MSOR Conference, Coventry University, 6th September 2011.

UNIVERSITY OF
RIGOUR
RESEARCH
RESULTS
WESTMINSTER

Student Numeracy Support Using Bespoke Reusable Learning Objects

Chrystalla Ferrier, School of Life Sciences, University of Westminster

Introduction

Numeracy and data handling are areas that many life sciences undergraduate students find challenging, but most career pathways from these courses require competence in the performance and application of a specified range of data manipulations. There has long been awareness amongst higher education staff that the numeracy skills of those entering undergraduate degree programmes have declined over the years and that entrance qualifications do not always correlate with mathematical ability [1]. Poor undergraduate module performance where numeracy skills are required can also be attributed to lack of student mathematics confidence which in some cases leads to excessive anxiety [2][3].

A recent small study with Level 6 BSc Biomedical Sciences students at the University of Westminster found a highly positive response from students to the provision of worked calculations to a selection of numeracy problems, which they were able to access via the virtual learning environment throughout the duration of a module. Most reported to using this in preparation for a summative data handling test and in subsequent student questionnaires 72% (*n = 25*) felt that its provision had improved their test performance.

Reusable learning objects (RLOs) provide a means for students to repeatedly access learning material and attempt formative assessments outside the classroom [4]. A project was undertaken to provide University of Westminster Life Sciences students with a bespoke local numeracy resource in the form of a RLO to support their studies.

Methods

Staff from the School of Life Sciences were asked to contribute one numeracy example, in a standard format of:

- Question
- Answer
- Method of calculating answer
- Applications
- Additional comments if desired

Graduates from the School of Electronics and Computer Science used Adobe CS 5.5 Flash Professional software, incorporating MP3 audio files, digital images and charts from Microsoft Excel to develop a RLO from the examples. The programme was saved in both ShockWave Flash (swf) and HTML format. Resizing to 95% was required for the HTML format to enable full functionality on laptop and PC screens. Training was provided for School of Life Sciences staff to enable editing of the programme as required (Figure 1).

A pilot version of the RLO was demonstrated in order to obtain feedback from School of Life Sciences staff. Material that was deemed unclear or discrepant was edited to produce the final version of the RLO. A link was created for the HTML final version to allow embedding into the University virtual learning environment, Blackboard.

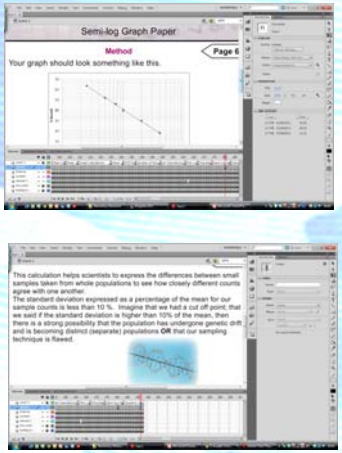

Figure 1. RLO programme development example pages.

Results

Figure 2 provides examples of screen shots from the completed RLO including the contents page. Users can select any example, they are asked to attempt each question first then select one of the four answer options. On selection a 'correct' or 'not correct' screen appears, but in either case the next pages display one method of calculating the example plus application comments at the end. The RLO will be available for student use from the 2011/2012 academic year.

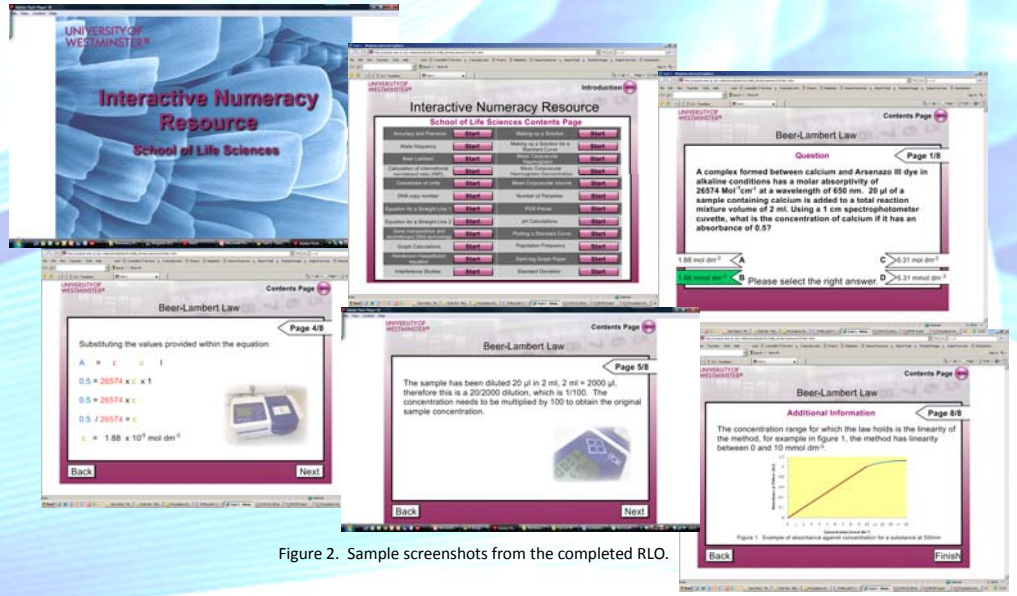

Figure 2. Sample screenshots from the completed RLO.

Discussion

The development of this RLO as a joint staff venture represents just one aspect of student numeracy support available in our School. Numeracy is embedded into generic academic tutorials for new starters at Level 4 and optional additional 'drop in' sessions will be available this year.

Collaborating with graduates from another School has been essential as there is limited local expertise in the use of Adobe Flash. The programmers had previously produced RLOs for their final year research projects. Initially they produced a selection of designs for the RLO from which a preferred option was chosen. The nature of the programming meant that the examples had to be converted into a second standard format, and multiple choice answers provided. Some of the examples contained more that one question and often a series of sequential questions, this was not a problem with respect to the programming. Very lengthy examples however, were split into appropriate separate subject headings so as to avoid excessive pages which may prove difficult to follow.

The fact that there is often more than one correct means of calculating the answer to a numerical problem is emphasised in the RLO introductory audio, although only one calculation method as provided by the contributor is shown for each example.

Repeated transcriptions from the original example being put into a new format for the programmers to the programmers themselves transcribing the examples into the RLO programme can result in minor errors. Thorough checks before final release are time consuming but essential to avoid unnecessary confusion for students using the RLO.

The importance of piloting such a resource to ensure alignment with numeracy teaching across the School cannot be overstated . Suggestions from the pilot meeting were the production of separate RLOs appropriate for each level of study and/or the production of separate subject specific RLOs containing many worked examples. Increasing student interaction with the RLO may also be required to improve effectiveness. To inform the next stages of this project we will await student feedback on the usability and usefulness of this resource in addition to the analysis of marks for assessments requiring numeracy skills.

References

1. Tariq, V., 2002. A decline in numeracy skills among bioscience undergraduates. *Journal of Biological Education*. **36** (2): 76 – 83
2. Parsons, S., Croft. T. And Harrison, M., 2009. Does students' confidence in their ability in mathematics matter? *Teaching Mathematics and its Applications*. **28**: 53 – 68
3. Bull, H., 2009. Identifying maths anxiety in student nurses and focusing remedial work. *Journal of Further and Higher Education*. **33** (1): 71 – 81
4. Windle, J. W., McCormick, D., Dandrea, J. and Wharrad, H., 2011. The characteristics of reusable learning objects that enhance learning: A case-study in health-science education. *British Journal of Educational Technology*. **42** (5): 811 – 823

contact: c.ferrier@westminster.ac.uk