Developing a pilot researcher-lead science module delivered on-line

David Robinson and Manfusa Shams

The idea

Over the past two years we have been developing a project that combines two ideas:

- linking research and researchers directly to Level 3 modules, as happens in the final year at most other universities;
- providing the top end of a ladder of learning for undergraduates in practical science - in an on-line world.

Practical knowledge/'learning by doing' is an effective way of delivering scientific concepts. It is based on an enquiry-based learning approach. There is evidence that enquiry-based scientific pedagogy enhances students' scientific knowledge and understanding (for example, Liu et al., 2009).

Background

Academic staff in other universities generally offer a short course, often linked to practical work, to students in their final year. Such a course links a member of staff with a small group of students interested in their own research area. The course can often be presented using the most up-to-date research findings as the staff member is teaching in their research area. Despite the specialised nature of the subject area such courses teach generic skills. In the Open University, such direct links with staff engaged in research rarely – if ever – occur.

Building a pilot

We have developed a model that will enable an individual member of the academic staff to offer a course in their own research area, able to evolve as the subject area moves forward. Short modules such as this would be embedded in the Level 3 curriculum. The model is flexible as possible, to allow the academic to present the course in the most suitable way for their subject and encourage innovation. All modules would include some element of practice, such as literature review, review writing, data handling, website construction, video/audio/photo presentations, dependent upon the research of the academic. The pilot has been constructed on the basis that a member of staff would run it themselves with self-generated material and appropriate learning resources. This project builds on work on a Level 1 on-line course in Science investigation (Robinson, 2011) and aims to provide Level 3 learning experience linked to research. As such, it would be part of the practical pathway now being developed in the Science curriculum. However, the module model would be applicable across the STEM area, and beyond.

Outline of the pilot

Week	Activity (generic)	Staff actions	Pilot – Human evolution
0	Website live		Set book purchase – no mailings
1	Introduction	Review article(s) and/or set book chapters and podcast	Podcast Set book (SB) chapters 1 to 4
2	Problem/discussion 1	Seed VLE forum discussion	Forum discussion Primate and anthropoid origins
3	First on-line tutorial	Publish reading list First lecture/tutorial	Review papers on 'Out of Africa' – SB Ch 5 to 8 Tutorial - Out of Africa versus multi-regional origin
4	Problem/discussion 2 Set-up practical task.	Seed forums on practical Podcast intro to practical	Task – How DNA sequencing of the Denisovans reveals relationships with modern humans
5	Forums and practical work		Literature searches and group work on forums
6	Second on-line tutorial	Tutorial on practical task	
7	Problem/discussion 3	Seed forums	SB Ch 8 to 10
8	Forums and practical work		SB Ch 11 and 12 and group work on forums.
9	Final on-line tutorial	Tutorial on practical work	
10	Work on EMA	Final podcast	Write up practical task and submit as EMA
11	Cut-off date for EMA	Start marking period	

Next steps

We would like to try out the pilot on a group of volunteers to test the feasibility of delivery by one/two members of staff and the outcome of direct contact/engagement with the researchers. 'We would be interested in working with teams developing the new Level 3 curriculum in Science. We hope the pilot model will provide a stimulating and enjoyable virtual learning experience, in which the learner takes an active role to negotiate and develop partnership with the learning environment ((Moss et al., 2011).

Liu, T-C., Peng, H., Wu, W.-H.,& Lin, M-S. (2009) 'The Effects of Mobile Natural-science Learning Based on the 5E Learning Cycle: A Case Study', Educational Technology & Society, vol.12, no.4, pp.344–358.
Moss, M. C, Brookhart, M.S. and Long, A. B. (2011) 'What Students Need to Learn: knowing your learning target', *Educational Leadership*, vol. 68, no.6, pp. 66-69.
Robinson, D. J. (2011). Collaborative experiments on-line in a course presented globally. *Bioscience Education.* 18

eSTEeM
exploring the frontiers of STEM education