VLE Pilot Project Case Study

Biomolecular Archaeology

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Overview

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<tr>
<th><strong>Title</strong></th>
<th>Biomolecular Archaeology (Autumn Term 2006)</th>
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</thead>
<tbody>
<tr>
<td><strong>Pedagogic theme</strong></td>
<td>Formative assessment and learning pathways (blended learning)</td>
</tr>
<tr>
<td><strong>Keywords</strong></td>
<td>Differentiated learning pathways; test quizzes &amp; adaptive release</td>
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<td><strong>Subject area</strong></td>
<td>The application of biochemical methods in Archaeology</td>
</tr>
<tr>
<td><strong>Student level &amp; profile</strong></td>
<td>Third year module for both Archaeology students (20 credits) and Biology students (10 credits), based on campus</td>
</tr>
<tr>
<td><strong>No. of students</strong></td>
<td>17 (6 Archaeologists and 11 Biologists)</td>
</tr>
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</table>
| **Key conclusions** | 1. The VLE’s access controls and content delivery tools enable the instructor to target content and activities at specific learning groups. Resources can be presented in different ways to students and the instructor may establish distinct learning pathways for groups of students to follow.  
2. The VLE’s adaptive release tools may be used to introduce formative quizzes as gateway activities to lecture notes, encouraging students to reflect on key concepts before moving on to new topics.  
3. IT literacy levels for students should not be over-estimated. The induction phase is critical in establishing confidence levels and targeted learning behaviour for on-line activities. Interaction between students within the VLE will not happen automatically and needs to be managed, with incentives introduced for on-line participation. |
Background

**Biomolecular Archaeology** is a third year undergraduate module for archaeology and biology students, which introduces the roles of biological and biochemical science in archaeology. The aim of this Special Topic is to provide a critical insight into the use of (bio)molecular methods to aid archaeological interpretation. Through examples it also attempts to highlight the difficulties that exist in archaeological science and the importance of current scientific research. The course is unusual in that both archaeologists and biologists attend the same lectures, with ideally the first hour focusing on the science and the second on the background either to the science or the archaeology. The second hour of the lecture is theoretically optional, but in recent years students have been encouraged to attend all aspects of the course and increasingly the distinction has been less clear-cut than in the original inception.

Previously the module has been supported by a course website, with an extensive range of web pages with links to lectures notes, resources and email lists for the whole group and subgroups. Student feedback has highlighted the “disorganised” nature of the web interface for these resources, as well as the view that the course has been aimed at archaeologists, with little account taken of the biologists. Prof. Matthew Collins, the course instructor, also observed that there had been limited interaction between these two groups of students. These shortcomings prompted a redesign of the course, with the VLE included in a revised blended delivery approach.

The new structure of the course for the autumn term 2006 was based on a combination of 10 two-hour lectures (attended by all) and 10 two-hour seminar sessions for archaeologists only. The introduction of the VLE was intended to address the specific learning requirements of each disciplinary group.
"As course director I can direct the student learning experience in different ways, which I can’t do in standard web-based courses."

"The rationale for using the VLE was based on the two 3rd year cohorts that I was teaching on this module, which had very different backgrounds. The course environment aimed to serve as an interface between the two, and that’s why the VLE was so attractive. As course director I can direct the student learning experience in different ways, which I can’t do in standard web-based courses."

For this module, the VLE was used to rationalise the interface between the content resources, assessment and collaborative tools, offering students a coherent and “complete environment” to work in. The VLE also offered the opportunity to control access to specific resources, so that biologists and archaeologists could be directed to appropriate activities and resources.

"The aim was to make the archaeologists aware of the potential of biological studies and vice versa. I wanted to make biologists tackle the archaeology questions, and archaeologists pick up biology techniques."

**Description of approach**

The blend for this module was based on seminars and lectures for the face-to-face component, and discussion, self-assessment and collaborative activities for the online component. The learning objectives of the online component were to:

- Enable students to follow discipline-specific or “enforced learning pathways”. The VLE’s adaptive release tools were central to this approach, with self-assessment tests used as a release mechanism for lecture notes. Mastery of the tests was a requirement to access further course materials. A related objective was to ensure that students covered unfamiliar material beyond their core subject areas.

Screen image showing two tests that are released based on discipline (using Groups)
Good performance in the test is in turn used to release the Resources Folder
- Facilitate collaborative learning amongst archaeology students, providing them with a space to upload presentations in preparation for the weekly seminars.

- Promote interaction, ideas sharing and support between the two disciplinary groups, through the establishment of shared discussion boards.

**Learning activities & tools**

The online component of the module included:

- Lecture materials. Weekly units of the module were released with web links and key readings, which were hosted within a course wiki tool - a collaborative writing tool for web pages, which may be set up to allow user editing and adding of content. The course wiki was the entry point for the course site. The use of a wiki, as opposed to static web pages within a content area, was intentional as it theoretically enabled students to enter comments on the lecture materials and resources, to add web links and make amendments to the course materials.

- Book resources, based on a publisher’s course cartridge on Biochemistry, with chapter summaries included.

- Reading materials supported by Sentient, providing links to the library catalogue and to full text articles / access to journals.
Self-assessment tests were used to cover and reinforce basic biomolecular lessons, to assess core archaeological and biomolecular skills, as well as students’ understanding of the lecture material. A range of question styles were employed within Blackboard’s assessment suite, with feedback provided to lead students to the right answers if their initial responses were not correct. The tests were intended to increase student confidence in their mastery of the taught material, and provide them with additional practice and understanding of relevant methods. To ensure that the tests were used, Blackboard’s adaptive release tool was employed, with lecture notes only released following the completion of each test. Students were required to answer 4 out of 5 questions correctly, in order to trigger access to the next set of materials.

Discussion boards to support student learning outside class sessions. A ‘Help’ board was set up as a forum for archaeologists to question biologists and help them access the lecture notes, providing guidance on test questions and vice versa. An additional discussion board was set up for archaeology students to pool their resources together for the seminars.

Digital dropbox for archaeologists to submit their seminar presentations and assignments.
Student profile

The entry questionnaire was completed by 15 of the 17 students, prior to the first lecture in week 2 of the course.

Experience with computers

The entry survey results revealed that students were established users of computers for information search activities, with all respondents accessing information from the web on a frequent basis. There was a division though within the class regarding the use of communication tools. Half of respondents had contributed to discussion forums / blogs, but half had not; 60% of respondents had used chat tools but 40% had never experienced this form of communication. Only a third of respondents rated themselves as confident in uploading files to a website.

Experience with computers for learning

Some of the biologists had experienced using the VLE for second-year modules (Social Aspects of Science and Environmental Issues), which were based around the use of discussion boards and file exchange tools, as well as access to lecture notes and web resources. Archaeologists were new to the VLE. This contrast in experience was reflected in the results, with 40% of respondents having followed courses in which course materials had been delivered online, and a third having completed online self-assessment activities. Only 20% of respondents had previously followed courses which involved the use of a discussion forum.

Expectations towards the VLE

Expectations towards the use of the VLE in this module were quite positive, with 87% of respondents agreeing that it would provide flexibility to learners in terms of their study needs. 73% of respondents agreed that the VLE would increase opportunities for discussion and debate and two-thirds of respondents agreed that it would enable an instructor to provide a wider variety of learning resources for students.
Outcomes of the pilot

The module was delivered over the autumn term 2006 (Weeks 1 to 9), with students attending two hours of lectures each week, and archaeologists also participating in a weekly seminar session. Feedback was collected from the instructor and students on the learning outcomes from the revised course design.

Activity statistics

Student log-in patterns were frequent across the module, with high activity recorded during the induction phase and during the mid-October and mid-November periods. 7 students recorded over 100 hits on the site, 9 students recording over 50, with only 3 students visiting the site less than ten times. Of the content areas within the site, the course materials stored within the wiki received the most hits (76%), with 7 students recording over 100 hits each for these pages. Of the course tools, the discussion board accounted for 30% of the total number of hits.

Interaction on the course site was quite limited, with no comments made by students on pages stored within the course wiki. The discussion activity was largely limited to the archaeologists’ seminar forum, which students used to identify presentation topics and to upload their presentation files. The ‘Help’ forum, which was established as a location for archaeologists to question biologists and help them access lecture notes and vice versa, remained unused. Only a couple of students completed their home page profiles as part of the induction activity.

Focus group feedback

A representative from each of the archaeology and biology groups was interviewed on learning experiences using the module site. Both students agreed that the course site was very useful in accessing lecture notes, which were made available after the class sessions. The biologists noted that for this module, all recommended reading was hosted within the VLE, including links to past papers and web sites.

The quizzes were also well received and contributed to formative learning during the module:

"The quizzes were quite a good idea, and were used as a trigger to access the lecture notes. Usually you are too busy to reflect on the lecture materials during term time, but this approach made you think about the information, and you could have multiple goes at the quizzes." (Biologist)
“The test quizzes were good, but I had to repeat the archaeology test four times, which was a bit embarrassing since I was meant to know that stuff.” (Archaeologist)

The targeted approach to the deployment of course materials also appeared to work well, with students able to log in either as an archaeologist or biologist.

“I liked the split in resources, with biologists and archaeology students able to access their own materials. I could access specific documents and locate definitions of terms, and there were lists on who was doing what on the course.”

(Archaeologist)

Students appeared to be unclear though regarding how to use the wiki to edit course materials. Suggestions for amendments to the materials (e.g. broken web links) were emailed directly to the course instructor, rather than by implementing fixes to the materials directly using the editing tools.

The discussion boards also did not catch on. The archaeologists’ board was used more for administrative purposes, not really for sharing ideas, which was done in the seminar session. The ‘Help’ forum wasn’t used at all, and there was still a sense of two separate groups of students following the course.
Exit survey feedback

The exit survey drew a poor response, with only 3 students completing the survey instrument. The numbers are too small to draw any firm conclusions, but the results highlight trends which appear to match the evidence gathered from the activity statistics and focus group feedback on student activity in this course.

Table 1: Selection of results from the entry and exit surveys

(%) Exit survey results shown first, entry survey results in italics.

<table>
<thead>
<tr>
<th>Survey question</th>
<th>SA%</th>
<th>A%</th>
<th>N%</th>
<th>D%</th>
<th>SD%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A VLE enables instructors to provide a wider variety of learning resources for students</td>
<td>13</td>
<td>53</td>
<td>20</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A VLE helps instructors to be accessible to students outside class</td>
<td>7</td>
<td>53</td>
<td>20</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A VLE helps students to prepare well before class</td>
<td>13</td>
<td>53</td>
<td>21</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A VLE increase interaction levels between students on the course outside of class</td>
<td>0</td>
<td>40</td>
<td>33</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>67</td>
<td>33</td>
<td>0</td>
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</table>

SA = Strongly Agree A = Agree N = Neutral D = Disagree SD = Strongly Disagree

The survey responses indicate that the VLE was viewed as a valuable tool for presenting course materials to students. As one student noted, the course site enabled the instructor to present resources in a coherent manner:

"I think VLE is an excellent way for the lecturer to provide course materials, particularly if there are links directly to papers which can be sometimes hard to find/access electronically and in the library."
The use of quizzes as a gateway to lecture notes also appears to have been well received, as “this meant you had to think and process the information that you had just received during the lecture”. The results suggest though that the level of on-line discussion and ideas-sharing was not realised in this module, a point taken up by one respondent in the open response section of the survey:

“VLE also has potential to allow a greater degree of interaction between pupils and between pupils and lecturers but I feel that this has not yet been achieved.”

Instructor’s feedback

Matthew felt that the initial upfront costs were high in terms of the time investment required to set up the module site and create the formative assessment quizzes, but overall students appear to have appreciated the revised module site.

“Students got a lot out of it – a lot more if they are forced to do the background work.”
"They found it a useful experience, but wouldn’t do the extra work without a carrot."

The biology students found the test quizzes useful. They found it easier for one student to attempt the quiz and then to print out the answers and photocopy to others. They found it a useful experience, but wouldn’t do the extra work without a carrot. (..) For archaeologists it is a 20 credit module and they are more actively engaged.

The level of on-line interaction was disappointing though. Students preferred to use Facebook – an independent web tool to host their profiles, rather than use the VLE’s homepage facility. Discussion postings were also quite limited. The ‘Help’ board was not used as a location to share information and pose questions. Archaeologists did use their own discussion board to select research topics and upload presentations, although the files were meant to be uploaded the day before the seminar, but on many occasions students brought them on memory sticks to the seminar itself.

**Student skills required & developed**

The two subject groups reflected markedly different level of competence in computer literacy, with the archaeology students, who were new to the VLE, running into difficulties at the start in their use of the VLE. In spite of a brief ‘show and tell’ induction at the beginning of the course, some of the archaeologists were confused over the correct tools to use to upload assignments, which suggests that a full induction may be needed for future cohorts. Both groups of students appeared uncertain in their use of the course wiki, which indicates that a formal training session is required for this tool.
Staff skills required & developed

Matthew found that on the whole the VLE is intuitive to use - most of it is 'point and click', but key tools such as the (question) Pool Manager are not. Indeed Matthew felt that in some ways the VLE was too easy and he felt that he benefited greatly from the instruction given by the VLE team – which was well pitched and paced.

One of the benefits of the training he followed was learning how to develop a pool of questions, which for reusability purposes is very important to master. The session on the course wiki was also very helpful, and persuaded him to use this tool to host the course materials, given the simple editing and HTML writing tools which can be used.

The set up and development process was quite difficult though, with Matthew required to switch between the course instructor’s role and student roles when reviewing the site, so that he could judge what a biologist or archaeologist would see when navigating the site.

Actions for further development

There is scope to improve the current course, making it more polished and easier to run. Enhancements will be addressed once the course has run more than once. A first step will be to include a comprehensive induction process at the beginning of the module – a step which has in fact been introduced for a revised module delivered during the spring term 2007.

The new induction approach engages students with the VLE right from the start of the course by:

- running a test which requires them to find resources using Google scholar and SFX to enable them to complete specific tasks;
- requiring them to use the wiki tool to sign up for seminar topics.

For future modules students will also be encouraged to develop their own wiki pages, demonstrating their understanding of key concepts such as DNA, chronology etc., and they will build these pages in parallel to the delivery of the course.
If students create web pages and their own structure, they will become much more involved in using the VLE.

Example of how a wiki page developed by students might look in the future

The aim will be to introduce VLE activities in the first week of the course and get students to start using the discussion tools, encouraging them to take ownership of them at an early stage. If students create web pages and their own structure, they will become much more involved in using the VLE.

There is also scope for the development of generic course materials on study skills to accompany the course, which address academic skills such as how to make proper reference citations. Students lose marks needlessly for errors in this regard, which could be remedied through the introduction of appropriate supporting resources.