

# Use of traditional and elearning components in a blended learning environment

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**Abstract:** Structural changes to an advanced first year human biology course integrated an eLearning component with traditional lectures and laboratory classes. An investigation of use and perceptions of usefulness indicate that the components have been successfully blended.

*In 2005 the course underwent a major curriculum review with a new structure emerging in which a significant amount of content was moved online. The online component became the focal point of the course with the remaining face-to-face activities (lectures and practical classes) blended with the new online component in a manner that emphasised equal linkage between them. This was very different from the previous course where online materials had been perceived by the students as supplemental to the course and not central, and they had reported their use of these to be essentially for revision. Over a two year period we have been investigating the use and students perceptions of usefulness of all the resources available in this course. We wanted to see if the way in which we had blended the learning materials changed the way in which students used them and if their perceptions of usefulness had changed. As we believed the blended model offered the students better opportunities for deep learning, we wanted to see if their written responses to short answer examination questions improved as a result of the new course format.*

## Introduction

In first year biology at The University of Sydney, a human biology course was originally taught in a very traditional manner with the six contact hours each week being equally shared between formal lectures and a three hour practical class. Activities to increase the support provided for students, to help them in their learning, included the development of online resources in the form of learning modules and self-assessment modules. These have been detailed elsewhere (Peat and Franklin 2002; Franklin and Peat 2001). A virtual learning environment (VLE) was set up (in 1998) to ensure all first year students had access to suitable materials at all times. The use of it and perceptions of usefulness is discussed elsewhere (Franklin and Peat 2001). It is to be noted that this online resource predates The University of Sydney's adoption of a learning management system.

With an increasing understanding of the needs of students and the provision of a more flexible learning environment, the focus for this human biology course was changed to include only two hours a week of lectures, retention of the three hour practical class but with the introduction of a weekly independent paper-based study module. The independent study module was introduced in response to student comments and requests to provide independent materials and to reduce the face-to-face component of the unit. Whilst the students appreciated the reduction in class time, they were not necessarily engaging with the independent materials even though these materials constituted the introduction to each new topic.

A more recent review of the course, and in response to favourable comments by students about online learning, it was decided to provide a more engaging scenario for the students that would also increase the flexibility of the learning opportunities. With the introduction of *WebCT* as the university default learning management system, more content from existing legacy materials was incorporated into an online structured 'tutorial', with text and graphics ('show me'), examples to work with ('let me try') and formative quizzes to check on understanding ('let me test myself'). This resulted in the development of *HOnline* (reported in detail elsewhere, Lilje and Peat 2006) that included these 'tutorials' as well as case-studies for group work. The courseware provides four formative assessment modules each related to timetabled topics in the course. These modules allow the students to read the prescribed texts and complete a variety of interactive exercises which include



text-entry, matching, labelling and word-selection. All the material covered in the course is assessed indirectly in either the timetabled quizzes or the final theoretical examination. HBOnline forms one-third of the course structure. The way in which students are directed to learn includes clear linkage between lectures, practical classes and HBOnline, through the timetabling of activities and integrating practical class notes with HBOnline materials. HBOnline is the focal point from which the practical activities, the textbook materials, and the learning and self-assessment modules are all linked.

This paper reports on the current research that is looking at student use and perceptions of usefulness of the resources embedded in HBOnline, and compares the current findings with those of the previous research. A similar methodology was used for all the studies. Paper-based surveys, given out in practical classes, included quantitative questions that used a Likert scale for measuring responses (Likert 1932) and qualitative open-ended questions that were thematically analysed and categorised (Denzin and Lincoln 1994). In addition we collected demographic information to validate the survey samples for each of the research projects.

We are interested in how students perceive the mix of learning opportunities that are provided in HBOnline and how well this online resource has been integrated within the total learning package. We are looking for evidence of engagement with the resources as a measure of integration.

## **Research findings**

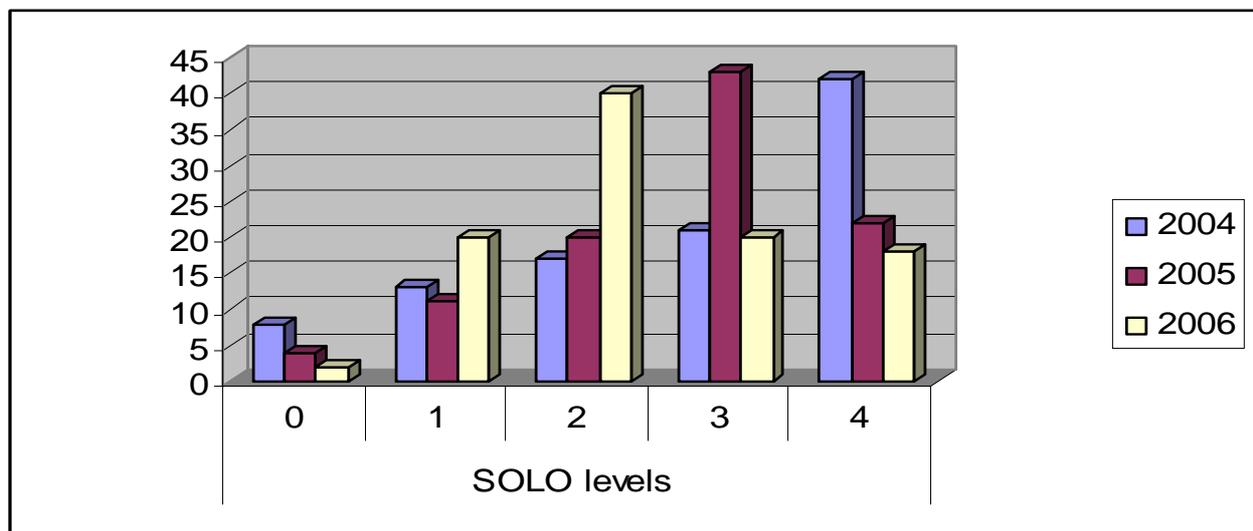
Our early research studies on the use of online materials indicated that, on average, about 85% of students were using the resources and that the majority of these users found them useful (63%) or extremely useful (32%) to their learning (Peat and Franklin, 2003). Asked what they used the resources for, students reported they used the resources for revision only (42%), for learning new knowledge (27%) and for consolidating knowledge (31%). Focus group discussions and open-ended question responses indicated that whilst most students used the online resources, they perceived them to be add-ons to the main course. This trend was seen again in follow-up research when we were looking for indicators of what engages students (Peat, Franklin, Devlin and Charles 2005).

For the current research the survey on the new curriculum was handed out to all students in 2005 and 2006, in class time. The response rate was 61% for 2005 and 75% for 2006 with a similar number of males and females responding in both years (males = 26% in 2005; 22% in 2006). In addition most of the students were full-time enrolled (98% in 2005; 95% in 2006) and they were mostly school leavers (95% in 2005; 100% in 2006). More extensive reporting of these demographic data, including perceived IT skills and backgrounds, are in Lilje, Krishnan and Peat 2007. With respect to how students perceive their use of the online materials, the data from these surveys indicate that the students perceive all the resources to be central to their learning and they are using the online resources to help them to learn new knowledge (57%), consolidate knowledge (22%) and for revision (22%). There is some variation between the two years of data (2005 and 2006) but it is not significant. For example, a higher percentage of students in 2006 reported that they used the online resources to help them learn and consolidate new knowledge. As the new curriculum becomes mature we may expect to find a further increase in this trend.

Students were surveyed about their perceptions of the usefulness of compulsory assessment tasks. They were asked to rank a task as 'did not use', 'used and found not useful (to their learning)', 'used and found useful' or 'used and found extremely useful'. Their perceptions of the usefulness of the task were compared with their performance of the task. Students only gaining a pass or credit mark for the task were more likely to have indicated the resource was not useful (19%) to their overall learning compared with students who gained a distinction or high distinction mark for the task and

who all indicated that the resources were useful. This is now providing us with evidence that our materials are successfully integrated.

To investigate whether there is any evidence to indicate that working with a more integrated learning package helps students to develop more sophisticated written responses to examination questions, we used a SOLO (Structured of the Observed Learning Outcome) taxonomic approach (Biggs and Collis 1982) to categorise written answers, with 0 (zero) indicating the lowest level response and 4 (four) an extended abstract response. According to Olsson (1999), the questions posed need to be ones that invite students to respond at a qualitatively high level. A suitable question is considered to be one that, in SOLO taxonomy terms, invites relational and extended abstract responses from students, as well as lower level responses. We initially choose two questions to trial this method but discarded one of them as it did not fit these criteria. We have data for 2004 (pre-introduction of HBOnline within the course) as well as 2005 and 2006. Plotting the SOLO scores as percentages, there appears to be no apparent trend. The predominant SOLO score varies for each of the three years investigated, as seen in Figure 1. The students in 2006, whilst all gaining at least a credit overall in the course, were scoring at a lower SOLO level compared with those students in 2004 and 2005.



**Figure 1.** Distribution of SOLO scores for examination answers

These data might indicate that the integrated curriculum has not had any apparent effect on the ability of students to write more sophisticated responses to examination questions.

## Discussion

We have made sweeping changes to a human biology course for a small advanced group of students so that the curriculum is driven by an online component (HBOnline). Our investigations are continuing to look at evidence that might support an argument for increased student engagement with the materials which would support our claim of successful integration. We had hoped that the tracking facility in WebCT might help us measure student engagement with HBOnline. Using the hits to determine frequency of use was found to be an unreliable way of estimating engagement. Anecdotal evidence suggests that students engaged differently with this eLearning component. As we have reported elsewhere (Lilje et al. 2007) many of the students used the print facility of HBOnline periodically to obtain paper-based copies of the exercises but continued to use HBOnline to check their answers. This raises the intriguing question of whether students are fully adapted to interactive online environments or whether they are still resorting to traditional paper-based study



techniques. There is the possibility however that this points to the students' flexibility in adopting and merging online and traditional study practices. We will continue to investigate these issues.

Our results are encouraging. Survey data indicate that the components of the course are all being used in a similar manner. In particular the results show that students now report that they use all components for learning new knowledge, which is a shift from the outcomes of our previous studies (predating the major overhaul, Peat et al. 2005) when online materials were primarily used for revision and not for learning new knowledge. In addition, whilst the assessment items remained essentially the same for the 2005 and 2006 cohorts, and the entry requirement into this advanced course was the same, there is an improvement in the overall grades of the students with the students in the 2006 cohort gaining at least a credit mark for the overall course whilst some students in the 2004 and 2005 cohorts only gained a pass mark. Whilst this is not proof of a maturing course format, it may indicate that, after fine tuning from 2005 to 2006, the students are showing evidence of deeper engagement with the resources and this is translated into increased overall academic performance. This is providing evidence that our materials are being successfully integrated.

Using a SOLO taxonomy to investigate the maturity of students' written answers in the final theory examination has not been able to provide evidence of maturity. Perhaps the question chosen did not fulfill the criteria suggested by Olsson (1999) and this would be considered in future work.

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