



Blended learning resources for a first year neuroscience/pharmacology module – an e-learning practice case study

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Background

The Faculty of Biological Sciences has around 2000 full-time undergraduate students and 20 undergraduate programmes in a wide range of bioscience areas. This case study relates to a trial involving the provision of online learning resources for a level 1 semester 2 ten credit module, delivered to approximately 180 students from a variety of biomedical science disciplines. The module is a traditional lecture and practical based course covering the fundamentals of pharmacology and neuroscience.

The challenge

We wished to improve our online blended learning resources for all undergraduate students in the School and decided to conduct a trial using this module. This module was chosen as previous student feedback has suggested that students find the quantity of material covered in the lecture course challenging, and so we hypothesised that improved online blended resources should help to address this issue. In addition, around 10% of the students enrolled on the module are from other areas of the Faculty and University and do not always have the appropriate prerequisite knowledge. Therefore, we wanted to provide additional resources to support these learners.

Intended outcome(s)

The intended outcomes of this trial were:

- 1) to provide online learning resources to support traditional lecture sessions;
- 2) to provide formative assessments with instant feedback linked to online learning resources;
- 3) to evaluate the value of video support with teaching materials and;
- 4) to evaluate various video production solutions from expensive to free.

Established practice

Formative MCQ assessments delivered online via QuestionMark perception were already established for other modules in the School prior to this trial. The PowerPoint slides used for delivery of the lectures were improved for this resource to include links to an online textbook, approved web-sites, and additional Wikipedia resources.

The plan

I conducted an extensive evaluation of the software solutions (Boxmind, Articulate Presenter and Microsoft Producer) available to deliver video/PPT slides/HTML content synchronously. Boxmind was initially considered the best solution as it tracked the position of the presentation and therefore moved the narrative along with the video / PPT slides. However, this software suffered a number of technical problems and a lack of support from the supplier, so we abandoned this solution. I then moved on to evaluate Articulate Presenter which is used very successfully by colleagues in the department. However, this solution does not allow synchronous presentation of a narrative alongside the video and PPT slides, and is very costly. I eventually settled on

Microsoft Producer (which is free) as it is very easy to use, is very compatible with Microsoft PowerPoint and produces professional looking web based outputs with video, PPT and HTML narrative on a single page.

The lectures on the course were all videoed by an AV technician in the previous academic session (thirty-three lectures in total) using a wireless headset microphone and video camera situated in the lecture AV room (right at the back of the lecture theatre – to avoid distracting the students during the lecture). However, some lectures had to be re-recorded in the following year due to problems with sound levels –this was due to use of a wireless microphone which appeared to suffer dips in performance in various places in the lecture theatre. In future projects we plan to use a better microphone to avoid these problems.

Division of work

Digitising and editing the lectures was a very time consuming activity, both in computer time to render the video, and user time to edit out inappropriate sections of video (digitising, editing and sectioning a 50 minute lecture can take up to 3 hours). All lectures were subdivided into sections based on the content, so that the final resources would be based on approximately 10-15 minute presentations. The rationale for this was two-fold: firstly, students may wish to revisit just one part of a lecture and are likely to get distracted if they have to search through long presentations to find the section they are interested in; secondly, we envisaged that students would find it useful to have the material broken down into manageable and defined learning chunks, each accompanied by an online formative assessment.

A narration of all lectures was produced by an undergraduate student employed during the summer vacation (this was considered a better option than employing an audio typist who may have struggled with the technical language used in the lectures). The PowerPoint slides used by the lecturers on the course were modified to suit the online learning resources e.g. links to an online book and approved websites were added as hyperlinks where appropriate. The final synchronised presentations (each containing a video, accompanying PPT slides and narration) were produced in Microsoft Producer and surfaced through a web-page embedded in our VLE. Each presentation was accompanied by an online formative assessment housed in QuestionMark Perception. The major disadvantage of this approach was the time-consuming nature of the task; after training, it is possible to produce around two completed 10-15 minute presentations per day.

The e-learning advantage

The advantages of this resource to students are clear: The resources are accessible 24/7 both on and off-campus, difficult lecture topics can be revisited and material can be reviewed for revision / understanding purposes. In addition, students have commended the integrated video, slides and notes approach – this is very useful for students' differing learning styles. Students with dyslexia have also commended the resources. The advantages of this resource to the institution will hopefully be apparent in improved module marks for this module and reduced failure rates.

Access statistics show the resource was used extensively by the student cohort (180 students had access to the resource); in total there were 1126 individual log-ins to the resources over a 12 week period, with an average of 93 log-ins per week. Predictably, the resource was used extensively prior to the summative examination for the module, with 287 users logging in during the preceding week. Most users accessed the resources between 9am and 10pm, but there were a number of users frequently logged in between midnight and 2am! The resources were used repeatedly by a number of students: around 20 students used the resource more than 15 times during the trial.

Key points for effective practice

A number of important issues have been raised by this trial:

- Microsoft Producer for PowerPoint 2003 was considered the best software solution to produce synchronised video presentations with PPT and accompanying HTML narration for practitioners with basic IT skills and a limited budget.
- Production time for blended learning resources is considerable but resources could be produced by qualified learning technologists with academic overview.
- Producer presentations must be hosted on a Windows Media Server due to the technical format of the output produced by Microsoft Producer.
- Availability of video presentations instead of audio streams alone was preferred by the student cohort tested (see questionnaire results).
- Video presentations of the whole lecture should be avoided, as students are unlikely to sit through a 50 minute online presentation. Producing short presentations of key topics encouraged students to engage actively with the material and then test their knowledge using a formative assessment with instant feedback.

Evaluation

We evaluated the effectiveness of the e-learning package in two ways: firstly, by obtaining student feedback via a questionnaire, and secondly by analysis of the examination marks for this cohort. The questionnaire results were very favourable:

Question	Av score (n=78) 5-strongly agree; 1-strongly disagree
I found the webpage easy to use and navigate	4.1
I would like to see similar resources to accompany other modules	4.7
The use of videos made the presentation more interesting and encouraged my use of the resource	4.0
I found being able to view the notes and slides at the same time as watching the video useful	4.2
Overall, after viewing the presentations and taking the assessments, I feel my understanding of the topics to have improved	4.3
It was useful to have the option of viewing and downloading the notes and the slides separately	4.5
The use of hyperlinks in the slide and presentation was useful	4.0
It was useful to have the lecture divided into subject areas and topics	4.6
The formative assessment tested my understanding of the topic	4.1
The presentations aided my understanding of the topics further	4.2
I feel the resource would have been as useful and interesting if audio clips were used instead of video	2.5

In the analysis of the end of module summative examination marks, we found students performed around 10% better on MCQs that had accompanying online resources ($P < 0.05$, unpaired T-test; $n = 26$ questions with online supporting content versus $n = 22$ questions with no online content; $n = 163$ students).

Pitfalls

Producing online learning resources from videos of lecture presentations is time consuming. For future projects, I would employ a learning technologist full time to complete the process and would estimate around 6 months work for a module containing around 30 lectures. Of course, the difficulty with learning technologists doing this kind of work is that it often needs scientific knowledge so staff with an appropriate background must be sought. However, once completed the resource should be fit for purpose for a number of years, especially since this is level 1 (mainly textbook) material. I encountered problems with branding – during the trial the structure of the module was amended and all the presentations had to be re-published with the new module title! However, careful use of branding and Style Sheets could have avoided this problem. Overall, this project has been a worthwhile learning experience to investigate integrating blended learning resources into a traditional lecture / practical based course. The skills learned include recording production quality video and audio, use of video editing software (Adobe Premier), use of presentation software (Microsoft Producer) and use of video streaming servers.

Conclusions and recommendations

- Availability of lectures as manageable topics with video, audio, presentation materials, narration & formative assessments meets the needs of all learners.
- Lectures can be recorded as they are being delivered to students as long as consideration is given to appropriate positioning of the camera (image quality balanced against distracting the students), sound quality, lighting etc. It is essential to record practice lectures in advance to ensure the quality will be acceptable once digitised.
- Blended learning resources are very popular with students and were used intensively throughout the module, particularly in the run up to summative examinations.
- Online blended learning resources improved performance by around 10% in summative examinations.
- Blended learning resources can be easily hosted in a VLE either through a webpage or as integrated content.

Additional information



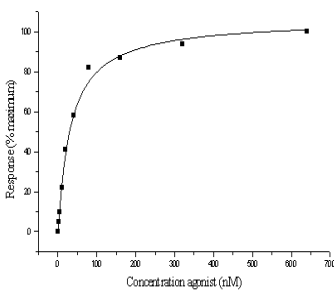
The screenshot shows a web page from the University of Leeds, Faculty of Biological Sciences. The page is titled "Concentration - Response Relationships" and is part of a VLE. It contains a table of contents for various topics related to pharmacology and drug action. The table lists topics such as "Terminology - Useful Terms", "Targets for Drug Action", "Concentration Response Curves", "Tissue Response", "Potency", "Agonists", "Competitive Antagonism", "Other Antagonism", and "pK_b and pA₂". Each topic is linked to a corresponding presentation or resource.

Topic	Description
Terminology - Useful Terms	Ion Channels, Enzymes, Carrier Molecules; Agonists; Antagonists
Targets for Drug Action	Receptors; Receptor Function; Receptor Activation
Concentration Response Curves	How to Construct Concentration and Log-Concentration Response Curves
Tissue Response	Fractional Occupancy; K _d
Potency	Calculations of EC ₅₀ , Potency
Agonists	Full, Partial and Inverse Agonists
Competitive Antagonism	Competitive Antagonists; Surmountable and Insurmountable Antagonists
Other Antagonism	Partial Agonists; Physiological, Chemical and Pharmacokinetic Antagonists
pK _b and pA ₂	Dose Ratios; Schild Equations; Schild Plots

A screenshot of the web-page in the VLE where students can navigate to the required presentations. This page illustrates how the lectures on concentration-response relationships were subdivided into manageable sections.

A Basic Concentration Response Curve

Guinea pig ileum response to agonist



CONCENTRATION RESPONSE CURVES

In the lab guinea pig ileum will be used to measure the response to drugs that activate muscarinic receptors e.g. Carbachol or Acetylcholine. The effect of these drugs is to make the tissue to contract. A graph of concentration (x-axis) against contractile response (y-axis) can then be plotted. This is known as a concentration-response curve. The axis should be clearly labelled in some form of molar units e.g. nM, mM, M etc. An important point to note is that the concentration of the stock solution being used is not the same concentration which is in contact with the tissue. The concentrations to be plotted are therefore both concentrations. The y-axis shows the response and there are various ways this can be represented and interpreted. One could simply measure the height of the peak on the chart i.e. a response in mm. These values are therefore relative to each other assuming the setup is the same. Another way would be to represent

Screenshot of a finished presentation produced with Microsoft Producer. The video of the lecture is displayed in the top left hand corner and has controls beneath. Users can skip to the required section using the contents bar down the left hand side. PPT slides advance automatically with the video presentation and users scroll down the narrative.

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