

JISC Developing Digital Literacies programme

Case study

Title	Flipped Classroom
Subject area	Physical Chemistry
Scope and context	<p>A second year course on spectroscopy (5 lectures) and a fourth year course on biomolecular modelling (5 lectures). The second year course contains many fundamental concepts and equations which just need to be learnt.</p> <p>The lecturer, Dr Nutt, created screencast (video podcast) learning materials for guided reading by students, who then undertook a quiz to test their understanding.</p> <p>The lecturer then used the results of the test to prepare materials for the timetabled slot where he ran a more engaging session addressing areas of difficulty and interest.</p>
Rationale and aims	<p>Contact time with lecturers is limited and precious, so why do lecturers so often use them simply to present material? Given clear directions, the students can read things for themselves (using e-learning materials in different media such as screencasts) and the timetabled lecture slots can be used to create a dialogue: addressing areas of difficulty or common misconceptions, applying the material to real-life examples and so on.</p> <p>Students find the topic of focus, physical chemistry, quite difficult, so there was a need to find a way for students to engage more with the subject and make it more accessible.</p> <p>There was also a desire to trial new teaching/learning methods.</p>
Digital literacies addressed	The member of staff developed skills in creating screencast video learning materials and uploading these to YouTube for watching by students.
Overview	<p>Dr Nutt initially conducted a survey of student learning preferences and analysed responses as well as collecting evaluation data throughout the course.</p> <p>Screencast materials were created to provide guided reading for students, based on audio-narrated PowerPoint slides and web-cam of Dr Nutt.</p> <p>Students watch the videos in their own time in advance of the timetabled lecture and their understanding is checked by getting them to complete an on-line quiz, with a number of questions based on the material, plus a final open-ended question asking whether there are things they have found unclear or particularly difficult. The day before the lecture, Dr Nutt collates the data, finds out what areas are causing difficulty and prepares material for the class which addresses these issues.</p>

	<p>Two of the lecture course have been flipped:</p> <ul style="list-style-type: none"> • A second year course on spectroscopy (5 lectures) The second year course contains many fundamental concepts and equations which just need to be learnt. In this case, the lecture slots can be transformed into workshops, in which the concepts can be put into practice. • A fourth year course on biomolecular modelling (5 lectures). The lecture slots for the fourth year course became more research-focused & descriptive, for example discussing a paper from the literature which uses the theories and approaches described in the screencasts to address a real scientific problem. <p>The lecture content is more condensed – 20 minutes instead of 1 hour for a lecture.</p>
<p>Digital resources and know-how used</p>	<p>The screencasts were prepared by the lecturer using:</p> <ul style="list-style-type: none"> • A web-cam • MS PowerPoint • Techsmith Camtasia Studio Pro software (www.techsmith.com) • A Yeti microphone (purchased as part of a previous HE-STEM project on developing video resources), • Sony Vegas Movie Studio – video editing software. <p>The screencasts were uploaded to YouTube. Quizzes were delivered within BlackBoard (VLE).</p> <p>The lecturer found the screen-casting and video editing software relatively easy to use, though he had had previous experience of making videos in an HEA STEM project.</p>
<p>Benefits and impacts</p>	<ul style="list-style-type: none"> • There were fewer students who got under 40% in exams wrt Dr Nutt's question compared to the previous year. • The learning materials will be of particular use for students who will be out on placements in industry for a year. • Quizzes test understanding of the learning materials and enable Dr Nutt to customize the face-to-face (lecture) to focus on areas of difficulties, common misconceptions and interests and to apply the material to real-life examples. • More detailed and focused feedback can be provided. • Greater student dialogue and engagement in the time-tabled lecture and allows much more time for students to ask questions. • Students approached the Dr Nutt and said "we are really enjoying these lectures". • Students can study the materials in their own time. • A useful resource for students when the revise for exams. • The experience developed Dr Nutt's digital skills and developed his profile in the university and field.
<p>Conclusions or lessons learned</p>	<p>Overall, the approach worked well and enabled more detailed and focused feedback to be provided to students. Dr Nutt said "I got a lot more detailed</p>

feedback [from the students' responses to the formative online tests] than I would from just giving a traditional lecture ... I'm very pleased with how it went ... I'll definitely use it again next year."

In response to the question about difficulties or lack of clarity, some responses were as follows:

- "Couldn't do question 6"
- "Slides 34 and 35 were particularly confusing for me"
- "Is it possible to go over all the equations needed for this course so we have them all on one piece of paper"
- "Would like more written information on slides instead of just spoken information"
- "How to the methods [...] fit into the general process of modeling whether systems are stable over time?"

.. the responses enabled Dr Nutt to provide more targeted and detailed feedback. The responses also show that some students were watching the material and not taking notes – so this needs to be stressed in the future.

Dr Nutt found the experience stressful at times e.g. the concept of the "Just-in-Time" lecture, where he had relatively little time to download student responses to the quiz and then prepare the lecture materials – though next time, this should be easier for him.

There were some attendance problems, where attendance drifted away.

There was positive feedback from students e.g.

- "Video lectures were very helpful for pausing and rewinding the lecture to further understanding"
- "Dr Nutt's lecture style was the best and most helpful. being able to pause and go back to video was really helpful. Genuinely wish it was able to go to all lectures/subjects"
- "The videos work really well and will prove useful for revision"
- "Able to revisit lectures and come to lecture with understanding"
- "Can pause videos and make notes so can take in more information"

There were also some negative responses:

- "Didn't enjoy flip learning – nothing wrong with Dr Nutt's lecture. I just prefer being in a lecture"
- "Didn't enjoy it – very few people learn just by listening and I'm not one of them"
- "Very frustrating this has been trialled on a module we'll be examined on in our very important final year"
- "Preferred having timetabled slot with lecturer to cover material otherwise videos were only 20mins long and didn't take much information in"
- "I found that what was in the podcasts was completely different to what we were doing in the timetabled slot"

The 4th year students were a bit less positive than 2nd year students and this perhaps reflected that the lectures were more research focused & descriptive and the quizzes had more open-ended (vague) questions,

	<p>which students did not respond to as well (where there was no single right answer). Furthermore, there seemed to be some concern about a change in teaching style on a module they will be examined on. Dr Nutt will reflect upon this to see what needs to be changed in respect of the 4th year cohort or maybe concentrate on the 2nd year cohort.</p> <p>Consideration must be given about placing the video resources on a public-access site.</p>
Links and further information	<ul style="list-style-type: none"> • Preparing to turn the classroom upside down by Dr David Nutt • Piloting the "flipped classroom" My introductory video podcast for the students
Further opportunities	<p>Dr Nutt will continue to develop his lectures using the same approach (particularly for the 2nd year cohort) and the model is one that is relatively simple for others (particularly in his department) to adopt. His colleagues have already planned to use a similar approach and have sought advice.</p> <p>The main barrier will be the technological skills one – becoming familiar with the software.</p>
Contact details for further information	<p>Dr David Nutt – d.nutt@reading.ac.uk Lecturer in Chemistry department. http://www.reading.ac.uk/chemistry/about/staff/d-nutt.aspx</p>