

Support for this project has been provided by the Australian Government Office for Learning and Teaching. The views in this project do not necessarily reflect the views of the Australian Government Office for Learning and Teaching

Case study 3.

Orchestrating teaching: the implications of flipped classroom



Summary

The use of a flipped classroom approach can allow greater freedom in the delivery design of lectures. Specific aspects of this case study include:

- Flipping the classroom: teaching theoretical concepts via online videos and increasing student-teacher interaction during face-to-face lectures
- Keeping student learning 'current': a model of delivery that allows for the latest information
- Increasing student motivation through authentic learning pedagogy
- Large class instruction: a sustainable approach

Keywords

Inverted classroom; blended learning; flipped classroom



What worked?

This case profile describes a lecturer based in the Faculty of Business and Economics who has incorporated flipped classroom principles into his first year statistics course. The term flipped classroom can be described as “a specific type of blended learning design that uses technology to move lectures outside the classroom and uses learning activities to move practice with concepts inside the classroom” (Strayer, 2012, p. 171). In this case, the lecturer’s main goal was to find a way in which to communicate the significant amount of content knowledge to students while having time to incorporate examples and a greater level of class interaction into his lectures to better ensure student comprehension. The flipped classroom model enabled the lecturer to divide content delivery into online and face-to-face components.

The theoretical content of the course is provided to the students in the form of *YouTube* videos. The lecturer recorded a series of 20-minute videos and made them available on his *YouTube* channel. The entire semester’s theoretical content is available in this way from the start of the semester. Each week the students are asked to watch the required video or videos online, prior to the in-class lecture. The in-class lecture then focuses on working through research-based examples using the theoretical concepts from the online videos.

Following the in-class lecture, the students participate in a lab class where they have the opportunity to apply their learning in a practical exercise, which is graded.

Flipped classroom in the Faculty of Business and Economics

David is a lecturer in the Faculty of Business and Economics. Several years ago, he became interested in exploring a different model of teaching that would give him a greater level of freedom in how he delivered the content of his lectures. David was concerned that the level of content that he needed to get through during lectures was leaving little time to cover examples and interact with the class. At that time, the discipline of statistics (now more commonly known as data analytics) was also undergoing a transformation. David observed that the changes in the field were moving too rapidly for print media and he was keen to find a method of delivery that was able to keep up with the constant influx of new information. Over the course of several years David worked through several modifications of his current flipped style classroom. He was interested in pursuing his theory that “students are best learning content [theory] at their own pace, in their own time.” He decided to present the theoretical content in short videos that could be easily edited when required. This meant that the weekly live lecture could be used to focus on creating a more dynamic and interactive learning experience for students in which David presents and works through statistical problems during the class that have a strong real-world relevance, the problems are often based on his personal research or that of his colleagues.

In my ideal world, the best teacher is also one of the best researchers, not THE best researcher but a GOOD researcher because that’s what inspires them to teach, it

makes their teaching alive because they're teaching from their experience, not from a textbook. (David)

David's flipped classroom format went through several revisions prior to arriving at his current version. Initially, David recorded the lecture in his office on his laptop using video software called *Echo Personal Capture*; he would then download the recorded video from the *Echo* website and copy it onto DVDs. However, David noted that this method was not particularly efficient if he needed to re-record content. David then trialled several other video recording programs but was not satisfied.

Finally, he decided to record videos straight onto his computer via a webcam and upload them to his *YouTube* channel for students to access. Each recorded video is fifteen to twenty minutes in length which David noted seems to be in line with student attention span, particularly when dealing with complex content, additionally the short video length enables David to re-record lectures or fix minor errors without needing to record a full length lecture. David records the videos in one-take and doesn't use a script; he feels that this contributes to the authenticity of the lecture, and "helps students to feel connected." David noted that making the theoretical content available online enables students to absorb the theory on their own, they can rewind and replay as much as necessary and then come to the in-class lecture with the necessary knowledge with which to understand the examples being demonstrated.

David also records his face-to-face lectures via *Google Hangout*. Students can attend the lecture in person or watch it live online, after the lecture the video is uploaded to *YouTube*. His lectures move quickly from one element to the next, each segment interspersed with open questions to the class or interesting anecdotes relevant to the content discussion. During the lecture David introduces the content by giving a real-life context (often based on his own research), presenting raw data in *Excel* and then working through the data with the students, making calculations in spreadsheets or producing graphs. David noted that working through the examples during class helps to engage students. In particular, he sees it as important to connect theoretical concepts to real life examples and then give students multiple opportunities to practice their learning- first with clear instructions and then on their own. For example, David describes the use of a dataset describing the impact of the tsunami in Sri Lanka on the local schools:

I start the lecture off with the story of the research: what it was, the tsunami; why would you need to do research on it; why would schools in particular be affected and so on. Then quickly jump to 'okay, here's the data that was collected...in your pre-recorded lectures this week and in your homework and your lab work, you're going to learn about pivot tables and so on...and then we're going to connect that with political bias in spending and various other things that are in the lecture. That's kind of the sequence that we try and go through, so that's quite a challenge to make all those connections. (David)

David has received lots of positive feedback from students and consistently receives high student satisfaction ratings.

The use of the flipped classroom approach is a sustainable model for David. He has been able to reduce his typical face-to-face teaching load by prerecording his theory lectures. David is able to reuse these videos across semesters. His in-class time focuses on demonstrating ideas, working through problems and responding to student questions, all of which is largely unscripted. Inevitably there is a need for careful preparation of materials and examples. There is also the need for careful linking between the flipped out-of-class content, and the in-class activities. Nevertheless, overall, he argues that his workload has been noticeably reduced, while at the same time he has observed improved student engagement and learning.

In the future David is interested in extending the interactivity of his live lectures. He is particularly keen on integrating a social media tool, such as *Twitter*, which would enable students to send messages to him during the lecture, the *Twitter* feed would be displayed on the large lecture theatre screens for students to see and interact with.

Why it worked

Enablers

There are a variety of enabling factors that have led to, or established, the conditions within which flipped classroom principles have been successfully used. This section highlights specific enabling factors that were evident in these specific case studies. These include:

Confidence in content and communication skills: The lecturer reported that he felt it is his ability to speak confidently and clearly in a manner that is engaging and energetic that makes his lecturing style successful in engaging students. This is aided by his confidence in knowing his content and being able to explain it in multiple ways.

Planning for a variety of activities during the on-campus lessons: In this case, student concentration, and their engagement with the content were aided through what David referred to as “rapid-fire segments” in which he segued from interesting stories regarding the data to audience questions to the demonstration of examples.

Simple technology: David noted that he has made a point to favour practical, simple and often free technology. Using free, web-based technologies like *Google hangout* and *YouTube* ensure students are able to access the content easily. David has applied this tactic in both the making of and uploading of his videos and during the recording of his in-class lectures, where possible he has also used existing technology to carry out his flipped classroom. Following this method has ensured that it is easy for him to create and upload content as well as being easy for students to access the information.

Authentic contexts and activities facilitated student understanding: David explained key ideas and processes in the context of data he had collected in his own research. He was able to explain the history and broader issues surrounding the data, including its implications, making it more accessible and meaningful for students. As they applied their new understanding of concepts and process (in this case statistics) they could understand the purpose, and better interpret the outcomes. They could also understand how the concepts and skills they are learning at university applied beyond their university degree.

Challenges

There are several challenges that can be noted in this case for the use of flipped classroom principles. These include:

Creating video and engaging students in effective ways is a balancing act that requires an iterative trial and error mindset: Learning the most appropriate design for video, including length, tone and content is going to vary on the discipline, topic, students and lecturer. Creating videos is easy to achieve with free and readily available technology, however not every video created will work as effectively with students as desired and consequently, a degree of self-evaluation and iterative development is needed despite the potential for a single video to be re-used each year. Similarly, creating effective learning activities for class to best leverage the videos is likely to need tweaking if not, a redesign. Therefore it is important for lecturers to acknowledge the possibility of less than spectacular results as they improve their instructional materials and design.

Unscripted lectures (video and in-class): David reported that his colleagues have attempted to record online lectures or integrate aspects of 'on the fly' lecturing, for example working out equations in real time. However, he noted that some struggled not having a specific 'script' for the lesson. His colleagues also struggled to do the videos in one-take and consequently the exercise was not time saving for them. David emphasised that it would be necessary for lecturers to adopt a more relaxed attitude in terms of students seeing less than a perfect performance from them. He noted that students respond well to that level of authenticity, it is able to transfer both across the screen and in person and it creates a closer learning dynamic.

What the research literature says

The flipped classroom strategy is becoming more common at all levels of education and particularly in higher education. It allows lecturers to make better use of class time by moving some of the typical lecture content (for example, talking at students without interacting with them) to outside the classroom. The flipped classroom model reverses the traditional lecture/teaching style with what is normally done in class and what is normally done as homework (Herreid & Schiller, 2013). Typically, the educator posts recorded lectures online and expects students to have viewed them, before coming to class to engage

in active learning activities (Herreid & Schiller, 2013; McNulty, 2013; Rutherford & Rutherford, 2013). In addition to pre-recorded lectures, educators may also provide other digital materials and related activities to further students' understanding so that when they attend the class they are prepared to actively engage with the topic at a deeper level (McNulty, 2013). Teachers adopting the flipped classroom approach need to shift from being transmitters of knowledge to becoming the facilitators of active learning, using their class time to engage students, such as through working out problems, answering questions or other activities.

As Wilson (2013) states, the main feature of flipped classroom involves moving the "transmission of knowledge" (for example, lectures) to outside the classroom and moving "application of knowledge" (for example, homework) into the classroom (p. 194). An effective 'flip' requires careful preparation by the educator, and an understanding of existing and emerging tools that are available to help support the out-of-class portion of courses (EDUCAUSE, 2012). The University of Queensland's research into the use of flipped classrooms found it is important for educators to take care in developing materials that allow students to come to class prepared, and be ready with questions they wish to discuss (Institute for Teaching and Learning Innovation, 2015).

To facilitate successful flipped classrooms, educators need to accommodate students using a familiar and safe learning environment (for example, Schoology, visually similar to Facebook) (Hunt, 2013), with appropriate supporting technology (Rutherford & Rutherford, 2013). Lecturers get to create their lectures then post them online, in the form of podcasts, PowerPoint with voice, videos and so forth. Pre-class work by students also frees up more time for educators to focus on discussions, further reinforcing students' understanding and also being able to provide more hands-on activities for students to be engaged in active, problem-solving based learning (Herreid & Schiller, 2013; Mason, Shuman, & Cook, 2013; McNulty, 2013).

One of the many advantages of flipped classrooms for students is that they can access class material outside of class time at a time and location convenient to them (Herreid & Schiller, 2013; Hunt, 2013; Mason, et al., 2013). Thus flipped classrooms allow students to take greater responsibility for their own learning in a space where they have greater independence and experimentation (EDUCAUSE, 2012). Flipped lectures enable students to review lessons in whole or in part, as many times as they want to/require in order to grasp concepts (McNulty, 2013). Rutherford and Rutherford (2013) also note that students learn best when they are given the opportunity to expand on knowledge acquired through flipped lectures in-class activities that promote greater creative and higher-level order thinking. Students who have difficulties with activities in-class can also benefit from peer support, and allowing lecturers to gain a better insight into which particular students require assistance (Herreid & Schiller, 2013; Wilson, 2013).

Audio-visual materials including video lectures, video podcasts and audio-enhanced PowerPoint presentations are commonly used for flipping classes to provide students with more opportunities for in-class activities or online discussions (Herreid & Schiller, 2013;

Mason, et al., 2013; Sankey & Hunt, 2013). An example of flipped lectures described by Mason et al. (2013) is the creation and use of 45 video lectures (each lecture lasting between 5 and 15 minutes long) to disseminate and cover course material in one engineering course. The video lectures contain the audios of the instructor explaining the course material with a live screen capture of the instructor writing equations. The video lectures were also made available to students on *YouTube*. Another lecturer teaching Materials Engineering made use of the readily-available *YouTube* video clips describing real-life cases of materials failure (for example, airline crashes) to flip his classrooms, and then used in-class time to invite crash investigators to share their knowledge and take students on site visits (Sankey & Hunt, 2013). Yet another lecturer developed a series of short audio-enhanced *PowerPoint* presentations to develop the academic skills of her students that were carefully connected to student-learning activities containing a stimulus (for example, a *YouTube* video) and a short task (for example, a 100-word reflection).

Whilst video or audio-enhanced lectures/presentations appear to be common mediums used by educators in flipping their classrooms, there are potential challenges associated with the flipped classroom approach which need to be noted. The flipped classroom may cause students to become quite resistant or concerned, as flipped classes require them to take on more responsibility for their self-learning (Findlay-Thompson & Mombourquette, 2014; Herreid & Schiller, 2013; Sankey & Hunt, 2013). Lecturers, tutors or instructors need to be trained on how to effectively structure and implement flipped classrooms which require substantial time and effort for the lecturer (Findlay-Thompson & Mombourquette, 2014). Also, lecturers adopting the flipped approach should ensure they provide relevant, up-to-date resources to better support their flipped lectures. Most importantly, flipped lectures should be carefully tailored for students to prepare them for in-class activities to maximise their learning experiences (Herreid & Schiller, 2013; Sankey & Hunt, 2013), because striking “a balance between active classroom activities and demonstration/clarification is important” (Butt, 2014, p. 39).

In addition to the many benefits (yet potential challenges) of flipped classrooms for lecturers and students is that, if implemented effectively, flipped classrooms can bring a degree of authenticity to students’ learning through real-life examples used and worked through by the lecturer and students in in-class activities. Authentic learning allows students’ learning to be defined in terms of real world relevance as well as providing a greater purpose and motivation to learn (Herrington, Reeves, & Oliver, 2010). Authentic learning that is facilitated using authentic contexts enables knowledge to be applied to real-life problems. Wilson (2013) argues that flipped classrooms should provide students with in-class activities that involve the use of application of specific techniques to new problems. Doing hands-on activities provided opportunities to students to reflect on the relevance of the course content to their professional goals, while group activities enable students to work in teams to develop teamwork and oral communication skills, which also become additional assets for employability and career success (McNulty, 2013). Mason et al. (2013) who adopted the flipped classroom approach was able to dedicate much of the class time for students to problem-solve, allowing them to present their solutions to solve problems; as a result, students who participated in the flipped classroom group performed as well or

better on all problems, and performed better on problems involving designs compared to their traditional lecture group peers.

Whilst flipped classrooms can have many benefits for addressing the ways educators teach and the ways in which students learn, certain challenges are associated with the implementation of flipped classrooms. The time-consuming nature of the set-up required for a flipped classroom and student frustration at being responsible for own learning (Mason, et al., 2013) can all contribute toward less-than-successful cases of flipped learning. Nevertheless, with careful design and implementation, flipped classrooms can play a key role in modernising education in the higher educator sector, by freeing up more time for lecturers to design learner-centred activities and in turn encourage students to become independent self-learners who are able to apply knowledge and skills to solve real-world problems in their future careers and lives.

Moving forwards

Participant advice

David articulated several key ‘methods for success,’ that he noted as being simple and effective practices that were related to the success of blended learning among their students.

Use the technology that you have - use simple, accessible technology that’s easy to use. Often the ‘free’ technologies such as *YouTube*, *Dropbox* and *Google Hangouts* are less complicated and are just ‘fit for purpose’.

Seek feedback from students - it’s important to get feedback from your students to ensure you are achieving your objectives.

Use authentic, real life examples - doing this stimulates students’ engagement in the subject, and helps them connect their learning and its relevancy to real life.

Consider your presentation skills - the way in which you talk can affect how students respond to and receive the information. Aspects to consider include voice tone, speed, clarity and enthusiasm.

Institutions moving forward

- Need to support faculties and lecturers who wish to implement a blended learning approach in their classes. It is likely this approach will require greater flexibility from institutions in the structure and frequency of face-to-face lectures.
- There needs to be support for the recording of lecture material particularly from a faculty level in terms of the technical skills required. Recordings from personal webcams and similar technologies may support such attributes as spontaneity,

responsiveness (immediate to student needs) and authenticity (sense of unscripted voice), however skilled technicians and appropriate technology can produce high quality videos that can be clearer and may advantage those lecturers not as comfortable using technology.

- Using a flipped classroom strategy assumes a shift in what goes on in face-to-face classes. This shift away from didactic lecturing towards active learning is something most lecturers are unfamiliar with and it is easy for them to revert to 'chalk and talk'. Specific guidance, activity ideas, and an understanding of how students need to also be supported in engaging in this new way need to be provided.
- Institutions need to promote flipped classroom and other strategies as part of the mainstream landscape, shifting away from such strategies being labelled innovative or out of the ordinary. The implication of flipped classroom is that 'chalk and talk' lectures are the default and by implication the tried, proven and accepted method of educating students.
- Institutions need to directly support students as much as lecturers in coming to understand the flipped classroom approach and its implications. Flipped classroom, or other teaching approaches, would be better achieved if accompanied by explicit support, such as we have already for library skills. It should not be assumed that lecturers who adopt different teaching approaches have the ability to support students in new learning demands, such as, being prepared to actively engage with the lecturer in the classroom, rather than simply sit and listen to the lecturer as they may have previously experienced.
- Video hosting is a crucial issue for institutions. This relates to the need for sufficient storage space, but also speed of access (for example, bandwidth) as well as inter-device operability (for example, on phones). In addition, functionality of video hosting needs to be considered. Not only should the video hosting be compatible with the learning management system (for example, functions to embed the video), but it should also offer the ability to 'scrub' (for example, fast forward and rewind). Students are used to engaging with social media video hosting platforms such as *YouTube* and as a consequence some thought should be given to the potential role of social media functions such as commenting and 'following'. Finally, the watching of digital artefacts, such as the videos, offers an opportunity for data to be collected to inform teaching staff about student engagement.
- Institutions need to consider the implications of copyright and control over content. Services such as *YouTube* offer a great deal of flexibility, inter-device operability, and social media options such as following and commenting. However, the use of third party hosting services may remove a degree of control such as who can access the media, and with potential consequences such as for Intellectual Property. In addition, if lecturers use their own accounts to upload the videos, then the university has no control or copy of the video content if the lecturer moves or even if they simply forget their password. The longer universities take to engage with the need for powerful video hosting services the more likely academics will increasingly turn to non-enterprise managed environments to meet their needs.

Resources for exploring

The following table outlines a range of technology useful for a flipped classroom approach. The list is not comprehensive; each system has been included because it has featured in the project data collection or in related literature or cases. In addition, the list does not mean to suggest endorsement. Each of the technologies needs to be individually evaluated according to the particular needs of the lecturers.

Dropbox	An online file sharing program. Files can be uploaded from any personal internet-enabled device. The file sharer can then invite users to access the files via email invite. URL: https://www.dropbox.com
Google hangout	A free feature available as part of the <i>Google +</i> package. <i>Google hangout</i> enables video calling via any personal device. URL: http://www.google.com/+learnmore/hangouts
YouTube	A popular video sharing site. Lecturers can create an account and upload videos from any internet-enabled device onto their personal channel. Students can search for these videos by name or subscribe to the lecturer's channel. URL: http://www.youtube.com
Echo Personal Capture	Software that enables lecturers to create videos using a webcam and then upload directly to the learning management system at their institution. URL: http://echo360.com/capture-options
Camtasia Studio	Software that records content on a web camera or digital screen. The recording can then be shared on any internet-enabled device. URL: http://www.techsmith.com/camtasia.html

Guides, Cases and Readings

- The Australian Government Office for Teaching and Learning has funded a project titled Radical Transformation: Reimagining Engineering Education through Flipping the Classroom in a Global Learning Partnership, led by the University of Queensland, which is exploring transformative course development through flipped classroom models.
URL: <http://www.uq.edu.au/tediteach/flipped-classroom/olt-transforming/index.html>

References

- Butt, A. (2014). Student views on the use of a flipped classroom approach: evidence from Australia. *Business Education & Accreditation*, 6(1), 33-43.
- EDUCAUSE. (2012). 7 things you should know about flipped classrooms. Retrieved January 12, 2015, from <http://www.educause.edu/library/resources/7-things-you-should-know-about-flipped-classrooms>
- Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education & Accreditation*, 6(1), 63-71.
- Herreid, C. F., & Schiller, N. A. (2013). Case study: case studies and the flipped classroom. *Journal of College Science Teaching*, 42(5), 62-67.
- Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.
- Hunt, M. W. (2013). Video and sound production: flip out! Game on! *Techniques: Connecting Education and Careers*, 88(1), 36-38.
- Institute for Teaching and Learning Innovation. (2015). What is a 'flipped classroom'? Retrieved January 12, 2015, from <http://www.uq.edu.au/tediteach/flipped-classroom/what-is-fc.html>
- Mason, G. S., Shuman, T. R., & Cook, K. E. (2013). Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course. *Education, IEEE Transactions on*, 56(4), 430-435.
- McNulty, R. (2013). Old flames and new beacons: the luminosity of online learning. *Techniques: Connecting Education and Careers*, 88(1), 40-43.
- Rutherford, R. H., & Rutherford, J. K. (2013). *Flipping the classroom: is it for you?* Proceedings of the 14th annual ACM SIGITE conference on Information technology education, Orlando, Florida, USA, 19-22.
- Sankey, M. D., & Hunt, L. (2013). *Using technology to enable flipped classrooms whilst sustaining sound pedagogy*. Proceedings of the 30th Australasian Society for Computers in Learning in Tertiary Education Conference (ASCILITE 2013), New South Wales, Australia, 785-795.
- Wilson, S. G. (2013). The flipped class: a method to address the challenges of an undergraduate statistics course. *Teaching of Psychology*, 40(3), 193-199.