THE CURIOUS PARADOX OF THE FLIPPED LECTURE: 
E-LEARNING AS A STRATEGY TO INCREASE AND IMPROVE THE 
ON-CAMPUS EXPERIENCE

Clare Newton, Dominique Hes
Faculty of Architecture, Building and Planning, The University of Melbourne (AUSTRALIA)

Abstract

In 2013 we ‘flipped the classroom’, initially one subject and then another. The flipping process has been a powerful learning experience for us as academics even though we are getting mixed responses from our students. Changing a pedagogical culture challenges both teacher and student and requires comprehensive change management strategies at many levels within a teaching and learning culture.

What is not yet clearly described in the literature is how the flipped classroom can throw up unexpected repercussions across the subject content and delivery, with implications for student and staff (dis)orientation within a foreign learning modality, for learning spaces generally and for technology specifically. On paper the shift to flip teaching made sense however our first innovation was not as successful as hoped. Student feedback indicates a strong preference for the more traditional lecture and tutorial format they were experiencing in other subjects. This paper attempts to unpick some of the complexities experienced in transforming pedagogy. At the finish of the first iteration, and as we are now midway through two more attempts, it is timely to reflect on what worked and what needs fixing. The two subjects explored focus on different aspects of the built environment within an undergraduate degree. Students in both subjects bring diverse learning styles. While most are aiming to become architects other students are aiming towards careers in property, construction, engineering, urban design and landscape architecture.

Flipping allows a curious paradox to occur. By providing more content online, it has been possible to enrich the campus experience beyond sitting in a theatre with two or three hundred other students. The transformation has not been an exercise in distance learning as might be experienced in a MOOC (Massive Open Online Course) such as a Coursera delivery but has, in contrast, been a way to engage students more in small-group learning, enriching the face-to-face learning and on-campus experience.

Keywords: Flipped classroom, flip teaching, learning spaces, on-campus experience.

1 INTRODUCTION

Flipping content delivery is disorienting our self-perceptions as lecturers and throwing up some bonuses and challenges. Providing most of the content delivery within podcasts and vodcasts removed our traditional lecture format completely in the first subject described in this paper. Instead of traditional lectures, a first-year cohort of 350 students accessed content in their own time. On-line content did not duplicate our normal mode of 50 minute lectures, but provided focused topics in 5, 10 or 15 minute presentations linked to texts and other resources with the expectation that students would be active learners bringing ideas and questions to the class time together. We reduced from two lectures per week to just one hour together as a large cohort in a theatre where we aimed to check understanding (and encourage timely access to podcasts) using polling software and quizzes. As our normal contact time with students is four hours per week, reducing the lecture time meant we were able to increase our tutorial/studio time from two to three hours each week enabling more hands-on activities in groups of sixteen students. This first iteration of flipped teaching we will call Subject A.

A different and potentially more successful strategy is being trialled currently in a later year subject using a hybrid of lecture format for the more engaging discursive content and podcasts for the information-rich delivery. Let's call this Subject B. Lectures attendance were retained at 2 hours per week but the second hour opened up opportunities for discussions with key industry people instead of delivery of information. For both subjects, students are still provided with the security of the framing lectures which are also used to provide guidance around workload, assessment and general expectations.
This paper is an opportunity to position the experience of these two subjects in the context of the literature on the flipped classroom and to reflect on the longer term implications for learning. Both authors remain committed to the learning benefits of flipped approaches, particularly if they enhance on-campus learning within the studio learning environment. With lectures often focused on information transfer, the replacement of lectures with on-line resources opens up new possibilities for on-campus learning. But there is still work to be done.

2 THE CONTEXT AND HISTORY OF THE FLIPPED APPROACH

Flip teaching or the ‘backwards classroom’ is not a new idea. In the early nineties, Eric Mazur saw potential to move the lower level teaching task of information transfer out of the classroom thereby freeing class time for higher order tasks such as application and integration of learning. Current technology makes the transfer of lecture content to students a straightforward exercise using simple screen and audio capture. Students learn in their own time, replaying content where necessary without having to work at the pace of others. This frees face-to-face time with students for higher order learning.

Eric Mazur, a physicist at Harvard University, predicts we are in the ‘twilight of the lecture’ suggesting that more active learning strategies may ‘overthrow the style of teaching that has ruled universities for 600 years.’ Taking active learning seriously means revamping the entire teaching/learning enterprise - even turning it inside out or upside down. For example, active learning overthrows the "transfer of information" model of instruction, which casts the student as a dry sponge who passively absorbs facts and ideas from a teacher.” [1]. The epiphany that drove Mazur to change his teaching strategy was the realisation that many students were answering assessment questions correctly without understanding fundamental concepts. His strategies include peer learning on the basis that peers are in a better position to teach at the required level for concepts to be grasped.

Flipped teaching, flipped instruction, the backwards classroom and the reverse classroom are used somewhat interchangeably but are not simply blended learning approaches using a mix of face-to-face and online. The following diagram adapted from Steed [2] usefully distinguishes our changed delivery in the flipped teaching approach beyond traditional delivery.

![Diagram](image1.png)

**Fig. 1** Traditional teaching - first three activities in lesson time with last outside the lesson

![Diagram](image2.png)

**Fig. 2** Flipped approach - first two activities before the lesson and last two in lesson time

In its ideal form, the flipped approach turns learning on its head. Students arrive in class having already assimilated instruction from online delivery. The role of the lecturer, tutor or studio leader is no longer focused on delivery of content but on application of content knowledge. Ready access to audio and movie capture technologies has made this approach accessible for all. Concurrently students have become experts at accessing information and so the focus has shifted from delivery of content to understanding and application.

It has been nearly a decade since Salman Khan starting posting maths tutorials on You Tube. He is now arguably the most ardent advocate of the flip teaching mode encouraging teachers to get students watching video lectures at home in order to do the ‘homework’ component in the classroom with teacher help nearby [3].
3 THE TRADITIONAL LECTURE FORMAT

The lecture format has been at the heart of university teaching for decades but an important change has occurred in the last decade. Lecture capture technologies are now standard and students typically have access to lecture recordings within moments of lecture delivery.

Along with other academic colleagues, we have been dismayed by students choosing not to attend lectures with attendance dropping to twenty or thirty percent by the end of each semester.

![Fig. 3 Lecture - with quiz](Photo: D. Hes)

![Fig 4 Lecture - one day later without quiz](Photo: D. Hes)

Lack of attendance made our decision to provide online targeted delivery easy but what we hadn’t anticipated was the extent of transformation across the subject as we shifted to a student learning environment from a content teaching environment. The simple decision to deliver online required us to entirely rethink our teaching and learning.

On paper, the pedagogy strategy of the flipped classroom makes sense and so we were surprised that students did not all share our enthusiasm for the shift away from the lecture format to the more intensive face-to-face learning in a studio format. Feedback from students included requests for more lecture content. This aligns with Mazur’s experience description of student resistance. "The generic complaint is that they have to do all the learning themselves.... They’d much rather sit there and listen and take notes. Some will say, "I didn't pay $47,000 to learn it all from the textbook. I think you should go over the material from the book, point by point in class" [1]. As most other subjects still follow the lecture format, we found students were comparing the expectations within our subject against their other subjects. Lectures effectively edit a knowledge domain. Lectures provide students a one-stop shop for the core content and learning tasks.

But there are also advantages in the lecture format particularly for first year students who are acclimatising to the university context. If students have questions they can ask them immediately or check with their neighbouring students for clarification. Listening to a podcast in isolation requires extra motivation. There is further advantage in delivery via lecture. We tend to be more engaged when communication is between live people and also more forgiving with a live performance. We accept the amateur theatre aspect of the lecture more readily than with online delivery as we have become so accustomed to more refined digital delivery.

4 SHIFTING MODES OF DELIVERY

In the two subjects we used two strategies. Subject A was largely new and we built the content from scratch to suit a flipped mode of pedagogy. Subject B was already running successfully and so the flipped approach was intended to streamline delivery and increase student engagement by getting students more prepared for the lecture. As Lasry, Dugdale & Charles write: "The conclusion remained counter-intuitive to us: lectures can be useful if students are properly prepared. Our heads are still spinning from that flip" [4]

In both subjects the online delivery was kept to short (5, 10 or 15 minute) video and audio uploads each focused on a particular topic. We wanted students to squeeze these podcasts into their spare moments rather than becoming an onerous task.
Fig. 5 What students were accessing in the Learning Management System (LMS)

What we hoped was to encourage students to engage with the online content and have the opportunity to demonstrate learning through assessment. Both subject coordinators had the aim of increasing attendance and engagement and improving learning as demonstrated through a higher the average performance in assessments. The marks distribution shown in Figure 5 for Subject B show a dramatic increase in assessment performance out of 100 hinting that flipped teaching is resulting in students demonstrating higher learning although this alone is not yet sufficient to indicate a cause and effect.

Fig. 6 Subject B Marks Distribution [BLUE-168 students without flip teaching RED-286 student with flip teaching]

Students can access content at their pace speeding up the delivery to get through it quicker or repeating difficult concepts. With nearly half our student cohort coming from non-English speaking backgrounds, there was value in being able to repeat content. A quasi-transcript was provided for students in the first subject with key terminology highlighted. In practice, the transcript was prepared in advance as a loose script and used to structure the short delivery. While content was not word for word it also provided an alternative mode of learning for those preferring to learn through reading.

5 MAKING THE TRANSFORMATION – WHAT WORKED

We were able to track students' use of the online learning using LMS tracking to correlate access and performance if not to the extent of being able to claim cause and effect.
In Subject B we found improved quality in their first assignment, with approximately 7% increased performance. We had many fewer fails and a shift of the bell curve towards higher marks. As we have the same cohort of tutors this is a satisfying result although it is too soon to say it was the result of the altered mode of teaching.

In both subjects we are encouraging students to keep up with accessing content by rewarding marks to successful completion of weekly quizzes using audience responseware software and online polling using BYO (bring your own) devices.

The other benefit with the weekly quizzes in both subjects has been that we can see what basic concepts students have not understood and then address those immediately or within hours.

Subject A pioneered the approach and made implementation in subject B much easier. For example: we anticipated that the recording of content would be more onerous than it turned out to be. Quicktime audio or screen recordings were straightforward. We initially struggled to then convert these formats to suit all devices and software which students might use but fairly quickly realised the advantages of using YouTube delivery.

Because the content delivery is being provided online, accompanied by key texts, we are able to provide value-adding experiences in the weekly theatre time including videos, panel discussions and Q&A.

Most significantly we are able to provide a hands-on learning environments within an extended three-hour studio session. Effectively we shifted from a short tutorial format to a studio in which student-to-student learning is complementing the tutor-to-student learning.

In Subject B though we did not change the type of contact hours, we used the space created by the online content to increase engagement with industry professionals.
6 THE CURIOUS PARADOX - AN UNEXPECTED OPPORTUNITY

Our decision to utilise e-learning did not mean that students were less likely to experience a campus education; instead students were undertaking more learning on-campus. For many years we have provided students with two hours of lectures each week as an entire cohort along with two hours of tutorials in a smaller group of a maximum of sixteen students. Incorporating e-learning strategies meant we could reduce time together as a class cohort and increase time within a weekly hands-on studio/tutorial. The three-hour studio/tutorial provided a richer peer-learning environment where content knowledge could be tested and applied using the larger campus as a 'learning laboratory'. In Subject A, students are developing their ability to visualisation in 2D and 3D in order to link working drawing strategies to buildings. We were able to provide a mix of studio learning and site visits within the extended small group time.

Each week we are finding that full attendance is occurring. It has been gratifying to hear from other first-year coordinators when Subject A was requiring attendance through weekly attendance. All subjects in the first year experienced increased attendance. It was as though there had been a culture shift. Although a cause and effect may not have been in play, the same lecturers found a reduction in lecture attendance in this current semester when we are running Subject A for the second time but have shifted the quizzes into the tutorials.

In Subjects A and B, attendance at the reduced number of lectures stayed close to 100% throughout the semester rather than dropping to 20 or 30% by semester end. We hoped to encourage students to engage with week-by-week learning by integrating a quiz or 'mini-exam' in class which was based on the week's readings, online video and online lecture (Fig 7. shows online content). This meant that not only did the student need to attend the lecture with the quiz, but they also needed to engage with the content, and therefore had the terminology and concepts for the week close to the surface. The energy in these lectures was also excellent. In Subject B, 5-10% would slip away at the end of the quiz. Unlike Subject A, the aim of the online podcasts for Subject B was not to replace all the lecture content but to introduce key concepts, terminology and regulations (the less visual and engaging material). In Subject B we did not reduce the face to face lectures, but increased the content from industry speakers aiming to help students prepare for their future careers.

Though the images above (Fig 3 and 4) show Subject B with quiz and without, if compared to the semester before where there was no quiz at all even the second lecture had a much higher attendance in the second semester (Fig 5 and 6).

Fig. 5 Lecture – semester 1 Photo: D.Hes
Fig 6 Lecture – semester 2 without quiz Photo: D. Hes

7 MAKING THE TRANSFORMATION – WHAT WENT WRONG

Search for articles on flipped approaches to teaching and one finds a plethora of positive anecdotes. It makes us ponder why our students (and us) are struggling more than expected and more than others describe in recent texts.
Our Learning Management System has many benefits for large cohorts but has let us down in two crucial ways. In Subject B, we wanted to check understanding with a mid-semester quiz. Online quizzes had always been straightforward but an LMS 'upgrade' removed the quiz functionality resulting in 200 stressed students.

The subject based learning management system (LMS) (figure 7) has a complex and inelegant interface compared with colleagues who deliver content in a purpose-designed web setting. We considered linking from LMS into more visually coherent delivery such as E-Book delivery with embedded videos but we were unable to resolve how to maintain tracking of student access in web content held externally to LMS.

It is useful to describe how reliance on technology let us down at times. We included weekly quizzes using bring-your-own devices. We found out too late and only after three weeks of failing technology that our relatively new basement theatre was not equipped for 350 concurrent WiFi connections for students to use polling software to answer the quizzes. Across the administrative sections of IT and infrastructure divisions on campus nobody seemed to be aware of limited WiFi capability within theatres. Everyone we spoke with presumed, like us, that a relatively new theatre with 350 seats would provide for each student having access to WiFi.

*Just to clarify ... are you saying that even though there even though there are 370 students (and presumably seats) in the class/theatre there are only 100 wireless access points?*

(Head of University Learning Environments to Service Manager, March 14 - Week 3 of semester)

*Well I cannot be sure. It may still be that something has broken or configured incorrectly and that is what I have asked the guys to clarify, but it is my uninformed suspicion!*

(Service Manager, same day reply)

Students were understandably outraged. Below are some examples of feedback provided by students one month into the subject before we finally swapped to paper quizzes.

*Get your quiz organised - Get IT working - The IT network needs to work - Give up on responseware - Stupid IT stuff and quiz stuff - Not of a fan of responseware as it is too unreliable - Wikiclicker problems? - Response ware is too unreliable - Get responseware working - Responseware needs to be improved significantly or completely removed*

(Student anonymous feedback)

As we shifted into the Subject B we found an above ground theatre to be more successful with WiFi access. We ran Subject A a second time in the following semester and chose to include quizzes within the smaller studio sessions. While this required different quizzes for the afternoon sessions to the morning, it had the advantage of giving tutors immediate feedback on what their student understood and where their knowledge gaps were. We retained clicker responses in two of the fourteen studios.
Clickers have the advantage or automating the marking and upload but we are realising that it preferable to have tutors mark a paper version to get immediate feedback on student understanding.

The weekly quizzes encourage students to keep up-to-date and provide us with timely feedback on strengths and gaps. Quizzes have the positive effect of full attendance at lectures but student' feedback indicates they feel over-assessed. We will retain the quizzes next year but are likely to remove much of the assessment to enable them from summative feedback to formative feedback which gives students and teachers a timely indication of understanding.

Mazur's strategy of peer learning within the large cohort was explored but without success. Mazur uses polling devices alongside student buzz groups in the theatre to explore more complex conceptual ideas. [5] Feedback from students indicated they found the process tedious rather than engaging.

Finally, the lecture theatres with their focus on the professor at centre stage do not spatially afford the types of conversations and student activities that better engage students with key concepts. While we were able to add value to the subject with a range of supplementary content, student feedback did not rate this content highly. Most students are strategically focussed learning for the assessment tasks only.

8 MOVING AWAY FROM A SUBJECT TEXT

In Subject A, a first year university subject, students found our choice of texts confronting. Previously we had provided students with a bespoke subject reader and workbook which effectively became a one-stop-shop for just about everything they needed to know in order to pass the subject.

In the new subject we chose two texts with content that will carry students through the degree and into practice. Indeed one of these texts is referred to by graduates as a useful handbook of detailing. We see benefits in students being exposed to the professional language and knowledge used by discipline experts even if they are only taking the first steps. We see each student as beginning a process of becoming a valued participant within a community of practice as defined by Wenger [6].

Student feedback however indicates a preference for a subject text in order to have the same level of clarity to their subject-specific texts provided through their high school subjects. We are resisting their requests preferring instead to continue to reassure students that are undertaking an induction to discipline knowledge.

9 TOO MUCH CHANGE TOO QUICKLY? PERHAPS - NOT NECESSARILY

Any change requires alignment of many factors and early adopters within a culture need to be sensitive to the hurdles that may prevent early success. In subject A we chose to use flipped processes to entirely transform the way the subject was conceptualised. We introduced first year, first semester students to a field of knowledge that extended beyond the assessment tasks in the hope that it would form the framework for later studies. In subject B the second author chose to add extra value to the delivery by using online delivery to free up the lectures for discussion and more conceptually interesting content.

Both of us have experienced technology letting us down in unexpected ways but that alone does not explain the anxieties felt by students, certainly when undertaking Subject A. Students use assessment strategically to focus their learning. As coordinators we also use assessment strategically to focus learning but we both may have overcompensated for the change with the implementation of too much formative assessment. In Subject A we will retain the quizzes as a useful mode of instantaneous feedback but include them primarily as formative assessment tools rather than summative assessment.

There are many affirmations available for flip teaching. Both authors remain committed to the change in principle but are finding the cautionary tales as educative as the positive outcomes. Shelley Wright explains: 'While I may not have intentionally removed the flip from my classroom, I would never resurrect it'. [7]

10 CONCLUSION

In 2013 as we transformed teaching and learning for large groups of undergraduate students we experienced both anticipated and unanticipated outcomes. Any change requires strategic alignment of
many factors including space, pedagogy, assessment, IT infrastructure and student expectations. We are confident that flipped teaching approaches are worthy of further exploration even though are experiences have been mixed. In particular, feedback from students is helping us to modify our approaches to ensure they find the experience and effort worthwhile.

REFERENCES


