

Flipped learning: lessons learnt and good practice for large first year health sciences classes

Final report 2016

Curtin University

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List of acronyms and terms used

Course – at Curtin this designates a program of study

EIHP – Evidence Informed Health Practice

FPHP – Foundations for Professional Health Practice

IPE – Interprofessional Education

IPFY – Interprofessional First Year

PD – Professional Development

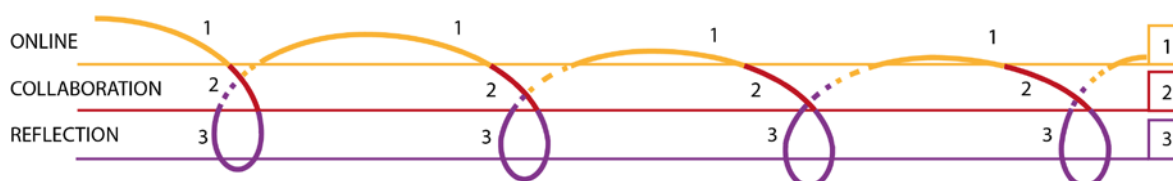
Unit – course is made up of “units” of study, typically there are 4 units per semester.

Executive summary

This seed project tested and evaluated a flipped learning model in two first year non-discipline based interprofessional first year units at Curtin University. The project has provided many valuable insights into developing materials and facilitating classes using a flipped mode. The project focused on designing activities, managing the classes and providing professional development for staff facilitating these classes.

The flipped learning model tested in this project was designed to respond directly to both a university-wide shift to implement the flipped classroom model, as well as student feedback from a previous project. The model was developed for first year students working in interprofessional groups in very large student cohorts. The model has three phases: online preparatory, in-class collaboration, structured reflection.

The development of the Miri model, with evidence from the literature and with input from 30 academics provided a model for large classes of mainly novice learners. The Miri model structures flipped learning in three phases.



The project was undertaken around two large health sciences units and:

1. developed and tested activities linking preparation with collaborative class activities
2. integrated challenge testing into both preparatory and collaboration phases
3. used an online anonymous peer based feedback tool, SPARK^{PLUS}, to help students structure reflection on group work tasks
4. conducted professional development for staff teaching in these large units focused on class management, use of challenge testing, co-teaching and flexibility in classroom teaching.

The project team found flipped learning needs preparation for both students and staff.

For students the project team found that the flipped model worked best when

- students could see the relevance of the online activities and clearly link online preparatory work to collaborative in-class activities
- challenge tests, both in the online preparation and in face to face classes, were used
- online preparatory activities were short and sharp, rather than passive reading tasks
- specific tasks were designed to help students reflect on team roles and their learning.

Specific aspects of the model that were found to work well were:

1) Online preparatory work that can be undertaken alone or with others

The preparation activities should:

- a. Clearly and overtly link to the in-class activities so that students can see the relevance of completing the preparation
- b. be active tasks such as
 - i. scenarios linked to videos or readings that involve decision making
 - ii. questions linked to personal experience,
- c. incorporate formative self-testing with short tests providing correct answers and feedback for both correct and incorrect answers
- d. be cognitively easier than in-class activities and
- e. be limited to between 45 and 90 minutes for first year students with indicative timings for specific activities

2) In-class collaboration that

- a. is activity based with clear contingent links to preparation activities
- b. uses formative in-class testing
 - i. with software such as Nearpod™ to allow single or group based responses to be collected anonymously in real time
 - ii. to give opportunities for tutors to identify areas of difficulty for students and adapt their teaching to help clarify difficult concepts

3) Structured reflection on learning and group /team development if desired

- a. Use post class testing that is formative
- b. Use SPARK^{PLUS} to provide students with an anonymous online tool to reflect on their own behaviour and give feedback to others in their group

Assessment across units needs careful planning because we have found, in a study of medical imaging students, that they report prioritising assessment over preparation (Fyfe, McKay, Fyfe, Nagendran, McVay and Broughton 2014).

Professional development (PD) workshops were also implemented to improve the facilitation skills essential for successful flipped learning, as well as to provide support and a reflective and information sharing environment for tutors. The workshops were designed within the flipped classroom mode, with participants asked to complete some short tasks via the BlackBoard™ learning management system before coming to the workshops.

The structure of the first workshop provided tutors with background to the flipped classroom, our three stage “MIRI model” of the flipped classroom, facilitating strategies and how to deal with the lack of student preparation. It also focused on tutor support and knowledge around types of faulty thinking and how to challenge beliefs, as well as co-tutoring and resilience. The workshop also focused on the use of Nearpod™, used for in-class challenge testing.

Combining the professional development for two units was a new and useful approach as generally units undertake PD separately, despite tutors often teaching in both units and having common issues of concern.

Professional development is critical to developing effective facilitators for the flipped model. Class management techniques (learning student's names and using them in discussion, moving around the class, developing questioning techniques that are non-threatening but engage students) and flexible approaches to facilitation are very important. Where classes are managed using **co-tutors** PD needs to provide guidance on optimising this style of co-working. Successful facilitators in co-tutored classes reported careful preparation for the whole class, meeting before class to share and agree strategies, and using each other's strengths during the class. They did not support an approach where the tutors split the responsibility for preparation and facilitating the class into sections.

On-going PD is also important as facilitators need opportunities to share practice and learn from each other in an on-going and regular way such as fortnightly meetings during the semester.

A video was also made to capture some of the experiences and advice from experienced unit co-ordinators and tutors. Two focus groups were conducted and video-recorded. The video contains 25 minutes of taped discussion divided into the following sections.

- Introduction to Flipped "Miri" model at Curtin (00:17)
- Unit co-ordinators
 - Designing for the flipped model (01:38)
 - Assessment tasks- using assessment in the flipped model (05:38)
 - Tutors working together in class- what makes a good co-tutor (10:05)
 - Class management techniques (11:43)
 - Tips for tutors (15:43)
- Tutors
 - Strategies for facilitating the flipped classroom (18:06)
 - Class management techniques (19:30)
 - Working with a co-tutor (21:54)

The project team found that students also need educating about their role as over a third believed that the tutor's role is to provide them with the correct answers so they can passively learn. Whilst the majority of the students in our survey responses reported that they knew about the flipped model, some responses suggested that they still expected a passive approach to learning.

This project has reinforced that designing effective learning activities, building facilitator skills through targeted and on-going professional development, as well as changing student perceptions about their role and the role of the facilitator is critical to the success of the flipped model.

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Chapter 1 - Background

With increasing government focus on accessibility and participation (Bradley, 2008) and the adoption of online and blended learning modes to deliver flexible, inclusive programs of study, the use of technology has become crucial to the business of higher education. The opportunities that technology now affords in the delivery of content and student assessment are changing rapidly (Barber, Donnelly, & Rizvi, 2013). Online delivery of content and distance based options such as Open Universities Australia (OUA), the United Kingdom's Open University and massive open online courses (MOOCs), have seen a huge growth in student enrolment (Allen & Seaman, 2007; Bates, 2013). Whilst instructional design has played a large role in designing and tailoring learning activities for online learning, it does not appear to be as evident in flipped or inverted learning models, as most early adopters have been enthusiasts working in discipline based groups (Lage, Platt, & Treglia, 2000; Marcey & Brint, 2012). In the rush to meet new demands for increased participation and adopt innovative technologies to deliver content, universities may not have adequately considered the pedagogy informing the flipped classroom. Davis (2013, p241) characterises flipped learning as a model that "adjusts the design and delivery of instruction so students take the lead and responsibility for learning before class so the instructor can spend class time working on applied learning activities."

Flipped learning has been gaining momentum, both in secondary (Bergmann, 2010) and tertiary settings (Butt, 2012; Marcey & Brint, 2012) and whilst there is pedagogy that provides a model for structuring learning, it is not well known (Davis, 2013). Academics, juggling discipline knowledge, research productivity and administrative loads, are unlikely to be aware of existing pedagogical frameworks for the flipped classroom and probably have not received any professional development in this area (Wiggins & McTighe, 2005). Davis (2013) points out that those involved in flipped learning may need a paradigm shift in their teaching and learning philosophy to successfully integrate flipped learning. Likewise, students need to be prepared, not only for the online delivery involved in flipped learning, but for their role, responsibilities and the expectations made of them in this learning model (Davis, 2013). For most contemporary students, study now fits into a busy work and social life (Barber et al., 2013) and students may be underprepared to successfully engage in the flipped classroom. Similarly, students' expectations of their role and academics' expectations of students may not be congruent.

In "Transforming Learning@Curtin", flipped learning has been introduced into a number of units where lecture content is delivered online, and students are expected to access this prior to attending face-to-face workshops or tutorials. In the Faculty of Health Sciences at Curtin University the flipped approach has been incorporated into the core units studied by all first year students, (approximately 2500 students over two semester intakes annually), in the Interprofessional First Year (IPFY) curriculum.

The IPFY units were implemented in Semester 1, 2011 with the aim of having high-quality, cognitively challenging, interesting and interactive face-to-face classes, and preparatory content provided online. Traditional tuition patterns, where conceptual material is explained in face-to-face lectures, encourages passive approaches to learning, shown to result in poor retention (Crouch & Mazur, 2001), compartmentalising knowledge and poor capacity to apply knowledge flexibly (Spiro, Coulson, Feltovich, & Anderson, 1988). The flipped model ideally has higher cognitively loaded activities and opportunities for applying knowledge in the face-to-face sessions. However, this may not be the case, especially when discipline-based units are retro-fitted with a flipped approach and learning activities may not be well aligned with the online material and may not extend students into higher application and problem solving tasks. Davis (2013) argues that students require effective preparation for flipped learning. Anecdotally, however, student preparation for face-to-face classes in these first year units falls away, sometimes quite early in the semester. Student satisfaction, through eVALUate (Curtin University's online evaluation system) and anecdotal evidence from IPFY tutors, indicates that, despite a lot of work developing resources and restructuring units, these units are "still struggling with student engagement" (Harris, 2013). This questions whether or not the current approach is pedagogically appropriate to engage and motivate students in the flipped classroom.

Similarly, are academics prepared for the change in approach to learning that the flipped classroom both offers and needs? As de la Harpe and colleagues found in a 2007 OLT project (de la Harpe et al., 2009), willingness and confidence of academic staff were major contributors to whether or not they adopted an initiative. Anecdotal evidence, especially from the more content rich units in the IPFY, suggests that academic staff may be willing, but not confident, to engage in the flipped approach, with some staff unsure of how to respond both to the changing teaching style and lack of student preparation. Active change management processes, including staff development, are critical to embedding new ways of working (de la Harpe et al., 2009). As Scott and colleagues (Scott, Coates, & Anderson, 2008, pxiv) note, change does not just happen and it does not happen after a single event; "it is a complex learning and unlearning process."

At Curtin University, all staff teaching more than eight hours a semester are required to undertake Foundation of Teaching and Learning modules. These modules introduce learning, teaching and assessment issues, theoretical perspectives and practical strategies for assuring quality, alignment of learning outcomes, activities and assessment, with a focus on the scholarship of teaching and learning and teaching excellence. Whilst these are all valuable areas and provide a great opportunity for exploration of educational issues there is less focus on the classroom management techniques needed to facilitate the large, cross cultural mix of novice and more experienced learners found in large first year health sciences classrooms. Much of the literature around classroom management focuses on primary and secondary school classrooms. Universities have made an implicit assumption that a strong discipline knowledge from tutors will provide the necessary background for

effective classroom teaching. And often it does, but many staff need more support. The evidence gathered in this project has made it very clear that good design for flipping a classroom is critical but, as critical, is effective facilitators. To ensure that facilitators are effective they need support through opportunities to share their experiences and practices, learn from experienced and effective facilitators and reflect on their own practice.

Thus this project aimed to refine a model for the flipped classroom, test the model and develop accompanying professional development that would optimise both facilitation by tutors and learning by students across the IPFY units.

Chapter 2 – Approach

Scope and objectives

The goal of this project was to develop, implement and evaluate learning activities specifically designed using a flipped pedagogical model and develop and evaluate professional development for academic and support staff and preparation for this model of learning for students.

The specific objectives of the project were to:

- Design and develop new online content and face to face learning activities;
- Design the professional development for academics and student preparation;
- Deliver academic professional development and student preparation;
- Implement new online content and learning activities in Semester 2, 2014;
- Compare student engagement, satisfaction and learning across current unit activities and those developed with the flipped learning model; and
- Evaluate Professional Development (PD) workshops and student preparation materials.

Background to the Units chosen for the project

The Faculty of Health Sciences developed an interprofessional first year that supports students transitioning into university study. The first year units provide 200 credits, split between two semesters. 100 credits are common to all Health Sciences courses, 50 credits are shared interprofessionally with specific professional course groups and the other 50 are specific to the discipline course. The first year contains four interprofessional first year core units taken by all health professional students. These units provide: the foundation knowledge and skills in the biological, environmental and social determinants of health; development of skills in communication; and academic skills, including the appraisal and critical analysis of literature and digital sources on health and illness and interprofessional engagement.

Two of the four core interprofessional first year health sciences units were chosen for the project. The units were chosen on the basis of unit co-ordinator involvement in previous development projects and their interest and availability, and that two of the half units in the IPFY were under review independently of this project.

The **Evidence Informed Health Practice (EIHP) 100 unit** (now called CMHL1001 Evidence Informed Health Practice) is a 25 credit point interprofessional first year unit at Curtin University. A large enrolment unit, 481 students undertook the unit in the first semester of 2014. In semester 2, 2014 1,957 students undertook this unit as part of their degree. The unit is focused on providing students with a solid knowledge base around evidence-based practice including data collection, observation, measurement and basic statistical analysis as well as providing students with the skills to understand and critically evaluate evidence. The unit is designed in a way that allows building and consolidation of knowledge over the course of the semester as opposed to a module-based approach. The unit consisted of one two hour workshop per week and pre-class preparation material consisted of videos, scenarios, pre-class activities and textbook readings either from the text book or other sources provided two weeks in advance through the LMS Blackboard. In-class challenge tests were incorporated for all teaching weeks as an opportunity for self-assessment.

The second unit, **Foundations for Professional Health Practice (FPH) 100 unit** (CMHL1000 Foundations for Professional Health Practice) is also a 25 credit point interprofessional first year unit at Curtin University. 2,293 students undertook the unit in the first semester of 2014. In semester 2 of the same year, 557 students undertook the unit as part of their degree. The structure of the unit is somewhat different to that of EIHP in that there are five modules which separate the content over the course of the semester, as shown below;

- Module 1 – Introduction to the Professional Practice
- Module 2 – Academic Writing
- Module 3 – Health Care Systems
- Module 4 – IPE Framework & Development of Health Care Practice Capabilities
- Module 5 – Communication in Health Care

The unit consisted of a one hour tutorial and a two hour workshop per week. Preparation material predominantly included textbook readings and accessing relevant topic-based information where needed.

The project background and team

The original team consisted of the team leader (Sue Fyfe) unit co-ordinators (Marina Ciccarelli, Mark Liddiard and Courtenay Harris), Dean, Teaching and Learning for the Faculty (Georgina Fyfe), evaluator (Linley Lord) and project officer (Michelle Broughton). However, between the application submission and the funding unit co-ordinators for both units changed. EIHP was taken over by Amanda Lambros and Rakhshanda Naheed and FPH by Annalise O'Callaghan and Karin Clark. All team members were keen to have input and so the team enlarged to include the current and past unit co-ordinators. This gave an excellent overview of the changes and adjustments the flipped approach had required for content delivery, what was working and what was not.

The available team members met on a fortnightly basis and worked through the model that the team felt would best suit the units. The team were influenced by Courtney Harris's previous OLT grant (Harris & Price, 2012) that looked at mechanisms for professional development that would help academics teaching in large units be more flexible and agile in their approach.

Scope changes

The initial plan for the project was to develop four weeks of learning activities, preparation materials and professional development materials for the two large first year health science units chosen for this project, EIHP and FPHP. This plan was maintained for FPHP but not for EIHP. Although the unit coordinator for FPHP remained the same, EIHP changed co-ordinators in semester 1, 2014 and a significant transformation took place in terms of the approach to teaching and learning and the way the content was taught in the unit. Although expectations were high, preparation levels of students were not as hoped in the new iteration of the unit. Lacking confidence and skills in how to facilitate the classroom and respond to students who had not prepared, tutors fell back on the traditional class teaching approach.

With second semester 2014 being the semester with the larger student enrolment in EIHP and significantly more tutors, there was significant concern around the tutors' capacity to facilitate both the flipped approach and the style of learning that the new co-ordinator had brought to the unit. It was felt that it would be detrimental to disband all the work that had gone into creating the new version of the unit and so the old version of the unit was amalgamated with the new version of the unit. The current unit coordinator and deputy coordinator, with input from previous unit coordinators developed the improved version of EIHP for semester 2, 2014. Thus the previously agreed four weeks of changes and testing of the changes were now considered unnecessary and inappropriate for EIHP.

The project team role in the Semester 2 2014 version of EIHP was one of value-adding to the learning approach of the whole unit rather than focusing on content for the four weeks. The use of challenge testing became a major focus of the changes to EIHP and the development and evaluation of this approach added a great deal of value to developing the flipped model of learning and teaching.

Chapter 3 – Development

The team met fortnightly throughout 2014 and worked on developing consensus on a flipped model, designing online surveys, professional development workshops, weekly learning materials and incorporating new technologies into the two units.

Development meetings

During the development phase of the project the project team spent many meetings finding consensus on our view of flipped learning and the best approaches to use in large units of mainly novice learners. The university model results in reduced student contact but is predicated on the assumption that students will undertake the preparatory work to make their face to face workshops effective learning activities.

The team used our knowledge of the literature and a model that had been developed in 2013 and built on during the 2nd International Teaching and Learning conference at Curtin Sarawak in Miri, Malaysia. The “Miri model” was conceptualised and presented to a workshop of 30 participants at the conference and developed from their experiences of this approach to learning and teaching. The three stage model involves an online phase, a collaborative phase that can be either face to face or again in the online environment and a reflection on learning phase. As an extension to that work, feedback from unit-co-ordinators and tutors about the challenges and issues they were facing was integrated.

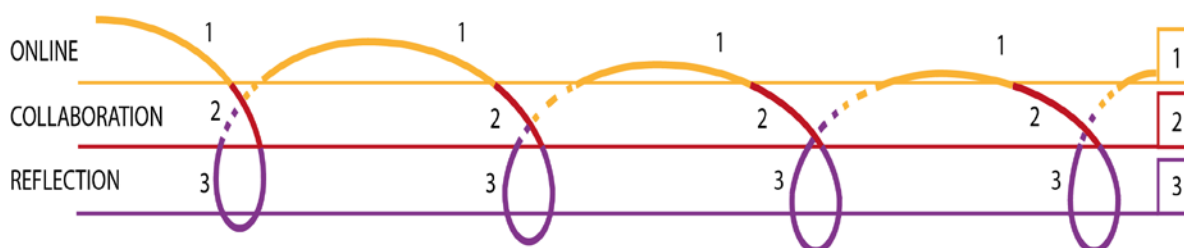


Figure 1 – “Miri” Flipped learning model

In a previous study the team had collected data from first year students for a different science based unit about their approach to this style of learning (Fyfe, McKay, Fyfe, Nagendran, McVay & Broughton, 2014). Students were strategic and they felt that it really didn't matter very much whether they prepared or not. They accepted that it was a good idea to prepare but other things: assessment, work commitments and “life” affected their motivation and preparedness. Feedback from tutors was disappointing. In response to between a third and a half of students preparing, tutors tended to go over important points, partly to ensure that everyone could undertake the designed learning activities – although the time for these was then reduced, and partly because they felt they should. For some

tutors “teaching the students” is part of their academic identity but many sessional tutors also felt under pressure because of potentially negative student evaluation of their teaching and therefore they made sure that they would “go through the material”.

The team needed to find a way to support tutors, encourage and motivate students to come prepared to their class and design materials that would keep relatively novice learners engaged. The team also needed to determine the areas of content to focus on for the changes to the unit and therefore surveyed both students and tutors.

Surveys

Online surveys were designed to gauge opinion on aspects of the two units that worked well and also those that could be improved, the concepts or topics that students found easy or difficult to learn and that tutors found easy or difficult to teach. The surveys were distributed to staff and students, both current and past students, via their university email addresses at various points throughout the year (**Figure 2**). Current students were classified as those students enrolled in the units at the time in which the survey was delivered during semester 1, 2014.

The study utilised Qualtrics™, a web-based survey application licensed for use at Curtin University. Figure 2 shows the surveys that were administered, the topics covered, participants surveyed and timing.

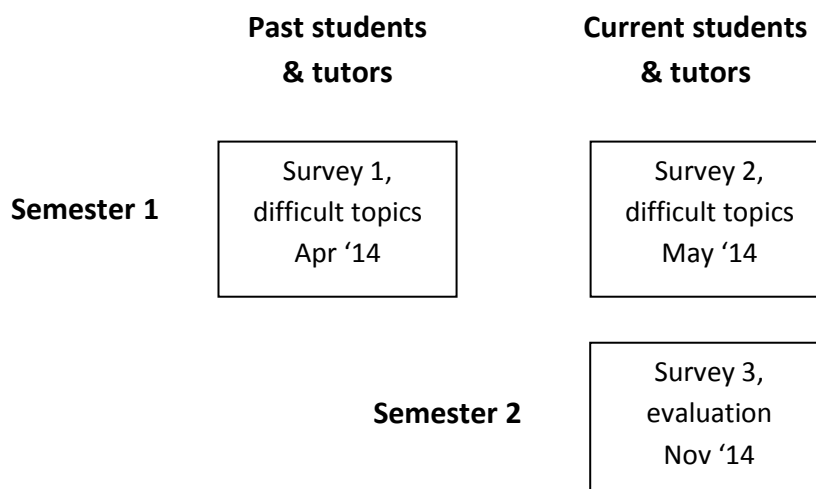


Figure 2 – Survey administration: topics and timing

In semester 2, 2014 surveys were again administered via Qualtrics™ to evaluate the changes made to the units and the impact of professional development workshops delivered to staff (described below). These surveys were administered in Week 14/15 of the semester. Due to the low response rates in the first semester and the timing of the administration of the survey during the latter stages of semester, a small incentive in the form of two \$50 Curtin

University recharge cards were offered to students in an attempt to encourage survey participation.

The University Evaluate system provided some useful summary information from much larger student responses. Students respond to a 5 point (strongly disagree to strongly agree) Likert scale on statements about the clarity of learning outcomes, usefulness of learning experiences and resources assessment, feedback, workload and quality of teaching. They are also asked about their own motivation and use of the learning experience offered. The results reported reflect the proportion of students who agreed or strongly agreed with the statement. Student responses from semester 1 2014, before project changes were made, were compared with Semester 2, 2014, after the changes had been implemented and semester 1, 2014 was compared with semester 1, 2015 in order to compare like cohorts.

Challenge tests

As part of the project, challenge tests were incorporated into the two units, both in slightly different ways owing to the content progression in the units. For the EIHP unit, in-class challenge tests were incorporated. These tests consisted of either short multiple choice questions or true false questions which were designed to assess students' pre-class preparation and understanding of preparatory concepts and material for that week. These tests were not part of the formal assessment for this unit. The challenge tests were the first in-class activity every week and student responses were used as a guide to modify the content of the class and address any particular areas of concern. If the majority of students struggled on a particular question, this was visible through the Nearpod™ and Qualtrics™ systems in real time. The responses provided the tutors with a starting point for discussion around those topics that students were finding difficult and which may not have been evident otherwise. Doubts and queries related to any particular question or concept in the unit assignments could be identified and clarified. For example, when some students were wondering and querying which one of the three ways was correct to calculate an odds ratio, the team were able to use a couple of questions in challenge testing to clarify that all three were in fact correct. In using the challenge tests this way, students received quick and targeted feedback to their test responses and to topics or areas of difficulty.

The challenge tests were considered a good self-assessment opportunity by the students who found them useful as well as interesting and engaging. Some students were appreciative that they could engage in self-assessment without feeling that they were being 'watched'. Students were also allowed to undertake challenge testing as a group if they wished and it was found that working this way encouraged group discussions and team building.

In FPHP on the other hand, two of the challenge tests were available via BlackBoard™ and were designed as short tests undertaken before the class allowing students to test their knowledge of the preparation content and find out whether they needed to do the whole

preparation, or focus on areas in which their knowledge was poor. The post-class tests were offered for students to test their knowledge and consolidate their learning for the week. Thus, in FPHP, challenge test content focused on evaluating what students did or did not know about that week's particular topic. In three of the modified weeks, feedback on right or wrong answers pointed students to the part of the preparation material they needed to go to in order to find out information about a particular topic. Post-class challenge tests were developed to see if there had been any improvement in student performance after the class had taken place, which depicts an inherent link between preparation and in-class material. However although students were less likely to complete the post-class challenge tests, they appeared to complete the pre-class challenge test, do the workshop and then move on to the next week, without checking their knowledge after their class activities.

Although discussed at various points throughout the project during project team meetings, challenge tests were not linked to assessment for either unit, owing in part to Curtin University's current assessment policy. However, student feedback made it clear that a link to assessment was not needed to encourage student participation in the challenge tests.

Weekly material modification

Weekly materials for the four chosen weeks in FPHP were modified by the unit co-ordinator with input from the larger project team and deputy unit coordinator. The four weeks chosen included the following topics:

- The Australian Health Care System (one hour tutorial)
- International Health Care Systems (two hour workshop)
- Team Function (two hour workshop)
- Research Ethics (two hour workshop)

The process of weekly material modification did not involve a complete overhaul of the unit materials as the content was relevant and up to date. For the Australian Health Care System changes comprised developing a challenge test, a scenario for students to complete and a post-class challenge test.

The International Health Care Systems workshop included a pre and post-class challenge test, a worksheet requiring responses to a seven minute video and a chapter of Australia's Health (Australian Institute of Health and Welfare, 2012). In class, students watched a video on health care systems around the world, which remained unchanged from the previous year. The focus of the video was to compare how five different countries deliver health care and what might be learnt from the differences between the health care systems. Students compared the health care systems in other countries with previously learning about the Australian health care system. Their focus of comparison included the funding of the

different health care systems (taxes and insurance companies), and the efficiency of the systems (wait times, gatekeepers, access to doctors).

The team function workshop again included a pre- and post-class challenge test. Also included was a short video on group work and a team roles quiz. This was the same team roles quiz that was used in the PD for tutors. However, due to tutor feedback, the quiz was modified into an online version (as opposed to a print and fill in form) to make access easier and to increase the likelihood of students completing the activity. The in-class workshop include the use of an interactive video resource called Partnering to Heal (<http://health.gov/hcq/training-partnering-to-heal.asp>). Students were required to work as teams to make clinical decisions based on scenarios presented in the video. The decisions made affected the outcomes for the clients presented.

The final topic, research ethics, included an *in-class* challenge test, no post-class challenge test and an in-class case study/scenario.

All in all, preparation materials for FPHP would take no longer than thirty minutes to complete for an average student. Students were advised how long each activity would take and the material was presented in a user friendly and logical manner.

In EIHP, an array of preparation materials remained available for students throughout the semester, once the unit had been modified. However, due to student feedback, preparation was usually kept to around 45 minutes to maximise engagement with a maximum preparation time of 90 minutes. Modification of weekly material in a week-by-week manner made the process easier to handle and was less confronting than overhauling huge chunks of content.

SPARK^{PLUS}

SPARK^{PLUS} is a collaborative platform for students to provide self and peer assessment (both qualitative and quantitative) to team members on various aspects of group-based activities and assessments. The tool was developed during Keith Wiley's OLT fellowship entitled "*Developing learning and professional judgement in large classes through collaborative self and peer assessment*".

The team saw SPARK^{PLUS} presented at the WA Teaching and Learning forum in January 2014. The team investigated its use at Curtin University and integrated it into the FPHP unit for semester 1, 2014. SPARK^{PLUS} was used mid-way through the semester for formative feedback.

Students were asked to evaluate their own contribution on the following scale: well below average, below average, average, above average, and well above average. Three criteria helped to structure their response:

1. Level of enthusiasm and participation during class activities

2. Suggesting ideas during group work
3. Helping the group to function well as a team:-shows respect to team mates - ability to resolve conflict as necessary.

They then evaluated their fellow group members on the same criteria. Each student received feedback on their own rating and those from their team members including qualitative feedback on their strengths and areas for improvement. Students then completed a summative reflection task on the feedback they received and developed an action plan identifying how they would continue to develop their group work skills. The students repeated the SPARK^{PLUS} feedback task again at the end of semester. This time their SPARK^{PLUS} ratings were used to amend marks, if necessary, in the group based assessment as well as to provide feedback on their team based contribution.

Review of Class activities

Part of the process of the grant included observing classes to see how the developed activities were implemented and how student preparation affected the way classes were taught. Whilst the observations were limited in number and time they showed considerable diversity in tutor experience and skill in class room facilitation irrespective of the student preparation evident. The observations confirmed our view of the critical importance of staff development in classroom management techniques and co-teaching.

PD Workshops

Professional Development (PD) workshops were also developed to improve facilitation skills in teaching staff that are essential for successful flipped learning as well as to provide support and a reflective and information sharing environment for tutors. The workshops were designed within the flipped classroom mode, with participants asked to complete some short tasks via the BlackBoard™ learning management system before coming to the workshops. For the first PD workshop, tutors were asked to prepare by watching two short videos (five and six minutes long, respectively) and completing a short online questionnaire (ten minutes). For the second PD session, preparation included a short paper-based questionnaire around team roles, that took ten to fifteen minutes to complete, and two videos on using SPARK^{PLUS} (17 minutes total) with short focus questions to answer as the videos played through.

The first PD workshop was split into two half-day sessions and took place on Wednesday 23rd and Thursday 24th of July, 2014. Tutors were given two attendance options, Wednesday morning and Thursday afternoon or Thursday morning and Thursday afternoon. The structure of the first workshop provided tutors with background to the flipped classroom, our three stage “MIRI model” of the flipped classroom, facilitating strategies and how to deal with the lack of student preparation.

The second session of the first professional development workshop gave tutors support and knowledge around types of faulty thinking and how to challenge it with positive self-talk and applying the A-F model (A – activating event or situation, B – self-limiting belief about the situation, C – consequences of this belief-emotional or behavioural, D – disputing the self-thinking belief, E – determine effective new beliefs, F – nominate new feelings) for challenging beliefs. The workshop also focused on co-tutoring and resilience, plus the use of Nearpod™, an interactive web and mobile based tool which allows the content creator to create interactive presentations which can include quizzes, polling, draw and label options and watch or create videos and allowing note taking during these activities, all of which can be pushed to a user’s handheld device. Answers to quizzes are immediately available creating instant collective and individual feedback to students. Nearpod™ was the mechanism for in-class challenge testing and the team wanted tutors to be confident in its use and to be able to trouble shoot, if and when required.

The second PD workshop took place on the 8th October, 2014 in week 10 of semester. The aim of this workshop was to provide tutors with data on student preparation for the materials developed for week 6, 7 and 8 in FPHP and gather feedback from the tutors about how they thought those particular weeks had gone and how the materials could be improved, for implementation in the upcoming week 12 topic. Student preparation data included BlackBoard™ statistics for access to the pre and post challenge tests (including possible points, completed attempts, average score and average time as well as the number of good, fair and poor, easy medium or hard questions). Data on student preparation also included Qualtrics™ data as Qualtrics™ was the platform used for the Australian Health Care System tutorial scenario. Data focused on responses and completion rates, as well as scenario start dates. Qualtrics™ data were also used to show evidence of preparation for the team function workshop, where students completed a Belbin Team roles questionnaire using the Qualtrics system.

Tutors from EIHP shared ideas on how their classes were going so far with some of the improvements they had made including in-class challenge tests using Nearpod™. In itself, combining the professional development for two units was a new and useful approach as generally units undertake PD separately, despite tutors often teaching in both units and having common issues of concern.

PD Video

After the grant funded PD workshops it was evident that there was a risk that the PD provided by the grant might not be continued in future semesters due to funding constraints. The team wanted to capture some of the experiences and advice from experienced unit co-ordinators and tutors around implementing a flipped model successfully with novice learners in large classes. To do this the team decided to film focus groups discussing these issues.

Two focus groups were conducted and video-recorded. The first focus group consisted of three unit coordinators /deputies. The second focus group consisted of nine unit tutors. Unit co-ordinators discussed designing learning activities for the flipped model, how they use assessment tasks in the flipped model, co-tutoring, class management techniques and facilitating the flipped classroom. The focus for the tutors was around class management techniques and successful co-tutor strategies.

The video contains 25 minutes of taped discussion divided into the following sections.

- Introduction to Flipped “Miri” model at Curtin (00:17)
- Unit co-ordinators
 - Designing for the flipped model (01:38)
 - Assessment tasks- using assessment in the flipped model (05:38)
 - Tutors working together in class- what makes a good co-tutor (10:05)
 - Class management techniques (11:43)
 - Tips for tutors (15:43)
- Tutors
 - Strategies for facilitating the flipped classroom (18:06)
 - Class management techniques (19:30)
 - Working with a co-tutor (21:54)

The video can be accessed [here](#).

Chapter 4 – Findings and outputs

Project Findings

The team found that flipped learning needs preparation for both students and staff. For students, the team found that the flipped model worked best when:

- students could see the relevance of the online activities and clearly link online preparatory work to collaborative in-class activities
- challenge tests, both in the online preparation and in face to face classes, were used
- online preparatory activities were short and sharp, rather than passive reading tasks
- specific tasks were designed to help students reflect on team roles and their learning

The team have learnt that staff teaching in these environments need on-going professional development to help them develop:

- Class management skills for dealing with large group based, co-teaching environments
- Flexibility in class teaching is important, based on results of student challenge testing, within a clearly defined framework of outcomes

Our project team worked in a collaborative interprofessional group that really helped us share and identify new ways of working.

More detailed findings are described below.

Student evaluation

Unfortunately, student response to Qualtrics™ surveys was low. The past FPHP student survey (those who had taken the units in semester 2, 2013) had a response fraction of 6 per cent (34 of 606). Past students of EIHP had a response fraction of 6.5 per cent (127 of 1,943).

The EIHP current student survey had a slightly improved, but still disappointing response of 10 per cent (51 of 490). The FPHP current student survey had a response fraction of 8 per cent (189 out of 2,293). A total of 9 tutors from EIHP and FPHP responded to the past tutor survey out of 23 (39 per cent response). Past tutors were again classified as those who had taught the units in semester 2, 2013. Twelve out of forty-four tutors from both units combined responded to the current tutor survey (27 per cent response).

Surveys administered in semester 2 received an 11.9 per cent response rate from students across both units (299 responses from 2,520 students). Tutor response rates were 18 per cent in EIHP and 38.5 per cent response in FPHP.

In May 2014, students were surveyed in EIHP and FPHP before the changes were implemented. In November 2014 those who had undertaken the units were surveyed. Whilst 71 per cent now said they knew of the flipped classroom approach only 49 per cent reported that they knew to prepare for classes although 74 per cent indicated that students need to cover some content before class and use class time for applying their knowledge. Over one third (36 per cent) felt that students have to teach themselves in this learning style and whilst the same proportion believed that the tutor's role was to encourage the students to complete the work in class, 38 per cent felt that the role of the tutor was to ensure that students get the right answers. Almost half the students (47 per cent) reported preparing most or all of the time before class but 20 per cent rarely or never prepared.

There were a number of positive comments about the use of challenge tests, especially using the Nearpod™ software in class. The team found that students liked the in-class challenge tests and post class tests and saw them as a class activity or formative opportunity rather than as an assessment task that would contribute to summative marks.

"...Having the weekly challenge questions available online is very beneficial to give you an idea of where you're sitting with the unit each week, it's a good way to test yourself after revising for assessments and exams too..."

"...Require more challenge tests..."

"...I really loved using the Nearpod app during class as it's so interactive and encourages students in class to pay attention and to get involved. I thoroughly enjoyed the drawing and weekly challenge quiz. I also found the challenge quiz to be a very helpful learning source to reconsolidate my knowledge, as well as be given good practice (time management) for the exam..."

However others did not engage.

"...I mainly used the lecture slides. Nearpod was of little advantage to me..."

In semester 1 and semester 2 2014, on eVALUate, overall student satisfaction with EIHP rose from 49 per cent to 63 per cent, with the major increases in areas such as clarity about learning outcomes, learning experiences (52 per cent-65 per cent) assessment tasks (53 per cent to 80 per cent) and feedback (46 per cent- 69 per cent). There was little change in perceptions of workload or teaching quality. In FPHP student evaluation of learning experiences, resources, assessment tasks and motivation all rose but by modest amounts. However, it is important to realise that the students were not specifically evaluating the changes made to the flipped model and there is traditionally different responses from semester 1 and 2 cohorts due to size and intake characteristics. To reduce these effects the team also compared eVALUate results from semester 1, 2014 and semester 1, 2015.

In EIHP, a unit many students find difficult, overall satisfaction with the unit rose from 52 per cent in semester 1 2014 to 87 per cent in semester 1 2015, with changes in evaluation of learning resources (59 per cent-85 per cent) and learning experience (59 per cent-85 per cent), assessment (53 per cent-91 per cent) and feedback (46 per cent-85 per cent) making large gains. Likewise students were more positive about the quality of teaching (63 per cent-90 per cent), their motivation (54 per cent-85 per cent) and their overall satisfaction reflected these changes (49 per cent-87 per cent). In FPHP, the agreement levels changed little between semester 1, 2014 and 2015. Although most statements reach 75 per cent agreement or greater, motivation to achieve the learning outcomes is consistently low at less than 60 per cent in the large first semester unit. This is contrasted to much higher agreement for the second semester enrolment which tend to have a smaller enrolment and more mature learners.

Tutor evaluation

Eight tutors who tutored in either EIHP or FPHP responded to a survey about their teaching in these units based on their experience in semester 2 2014. As respondent numbers were very small, responses related to the flipped approach have been aggregated. The main roles these tutors saw themselves as having in the classroom were to keep the students on track (85 per cent), encourage them to work as a team (70 per cent), to ask questions (85 per cent) and to manage time (85 per cent). They did not so much see themselves as ensuring that students “get the right answers” (42 per cent) or managing class behaviour (56 per cent) or off task behaviour (56 per cent). All respondents felt that they were well prepared to facilitate the flipped approach although some found waiting for students to respond, not giving students the answers and the need for flexibility in the class to be challenging aspects of facilitating a flipped classroom. There was concern about classes being predicated on technology that worked inconsistently even though they were very positive about the opportunities offered by technology such as Nearpod™. Only three respondents had attended the PD workshops. They found it useful but would like more follow-up on a regular basis.

“...In training, having a practice at what will be done in class is helpful. I learn by doing so it is helpful...”

“...MORE ongoing professional development. Need opportunities during semester to discuss challenges and different approaches. Would also be a good reminder of what we are doing and why we are doing it to keep on track with the model...”

No respondent wanted PD to be provided in an online mode using a “just in time” approach.

Tutors were also positive about the use of challenge tests, especially in class using the Nearpod™ technology. They felt that better students made use of tests in the preparatory phase and that students need to be able to check answers for these tests.

PD Workshops

22 tutors from both units attended the workshops. As many sessional staff have other work commitments, the two sessions were split over three times to optimise participation.

Overall response to the professional development workshops was positive. Comments from the tutors included;

"...All very useful topics. Faulty thinking and mindfulness very important. Also liked the introduction of Nearpod and other related technologies to further engage students and change the nature of the learning environment..."

"...Could have been longer than it was. Some elements were rushed with little opportunity to really practice or discuss the ideas..."

"...More ongoing professional development. Need opportunities during semester to discuss challenges and different approaches. Would also be a good reminder of what we are doing and why we are doing it to keep on track with the model..."

The major themes to emerge from the evaluation of the workshops were that the tutors, especially those working sessionally, value and want more opportunities to develop both their skills and a community of practice through ongoing PD in their units. Co-teaching is a joy for some and a challenge for others. There was a clear view that successful co-teaching does not occur without each partner taking responsibility for preparation and having a clear view of how each tutor will operate in the co-teaching relationship.

Chapter 5 – Collaborative approach and linkages

The project team held meetings on a fortnightly basis over the course of the project to discuss progress, areas for improvement and future directions. Fortnightly team meetings were a useful approach in terms of project reporting and were particularly useful for team learning and the development of ideas. The joint meetings between current and past unit co-ordinators and between staff of two different units was an opportunity to learn from each other in a way seldom found in busy academic life. The project evaluator attended many meetings and provided a “critical friend” for the project.

Linkages

Throughout its course, the project utilised linkages with two other OLT funded projects to aid in the development of learning activities and the professional development workshops. The two OLT funded projects were:

- Developing academic staff capacity for agile teaching: a case study in implementing eMarking workflows for student assessment; and
- Developing learning and professional judgement in large classes through collaborative self and peer assessment.

The project drew on the OLT fellowship of Dr Keith Willey “*Developing learning and professional judgement in large classes through collaborative self and peer assessment*” and that work provided an excellent platform to integrate team based reflection into FPHP. Since the use of SPARK^{PLUS} in FPHP was piloted in Semester 2 2014, the Faculty of Health Sciences has purchased a site license and provided administrative support to allow SPARK^{PLUS} to be used in a number of other units within the Faculty. Eighteen units across the Faculty were using SPARK^{PLUS} throughout 2015 and several other units are considering its future use.

The project also utilised team member linkages with other Curtin University staff members, particularly in relation to interprofessional first year teaching.

Chapter 6 – Dissemination

Findings of the study, including the good practice strategies for using the flipped learning model in large classes (Sue Fyfe, Georgina Fyfe) and use of Nearpod™ for in-class challenge testing (Amanda Lambros) have been presented at Curtin University and were presented at the Teaching and Learning Forum 2015 at UWA, Western Australia on January 30th.

A presentation on February 18th 2015 by Rakhshanda Naheed was made as part of the School of Public Health research seminars. A workshop was also presented at the 2015 Curtin Festival of Learning (March 20th) that gave us an opportunity to provide the participants with an experience of being in a flipped classroom and to discuss issues and challenges faced and some approaches to meeting them.

Team leader Sue Fyfe presented a keynote address at the 3rd International Teaching and Learning conference in November 2015 in Miri Sarawak, on the flipped learning model, using the flipped model.

The PD video will be made available to the Faculty of Health Sciences and more broadly within Curtin University for staff to access and for Unit co-ordinators to use in the professional development they offer staff teaching in a flipped model. It will also be available to the wider academic community through the OLT website via direct link.

Chapter 7 – Recommendations

The project has provided many valuable insights into developing materials and facilitating classes using a flipped mode. The development of the Miri model, with evidence from the literature and with input from 30 academics provided a model for large classes of mainly novice learners. The team recommend that flipped learning is structured in THREE phases.

1) Online preparatory work that can be undertaken alone or with others.

The preparation activities should:

- a. Clearly and overtly link to the in-class activities so that students can see the relevance of completing the preparation;
- b. be active tasks such as:
 - i. scenarios linked to videos or readings that involve decision making
 - ii. questions linked to personal experience;
- c. incorporate formative self-testing with short tests providing correct answers and feedback for both correct and incorrect answers;
- d. be cognitively easier than in-class activities; and
- e. be limited to between 45 and 90 minutes for first year students with indicative timings for specific activities.

2) In-class collaboration that

- a. is activity based with clear contingent links to preparation activities
- b. uses formative in-class testing
 - i. with software such as Nearpod™ to allow single or group based responses to be collected anonymously in real time
 - ii. to give opportunities for tutors to identify areas of difficulty for students and adapt their teaching to help clarify difficult concepts

3) Structured reflection on learning and group /team development if desired.

- a. Use post class testing that is formative
- b. Use SPARK^{PLUS} to provide students with an anonymous online tool to reflect on their own behaviour and give feedback to others in their group

Professional development is critical to developing effective facilitators for the flipped model. Class management techniques (learning names and using them in discussion, moving around the class, developing questioning techniques that are non-threatening but engage students) are very important to keep students on track. Facilitators need opportunities to

share practice and learn from each other in an on-going and regular way such as fortnightly meetings during the semester.

Students also need educating about their role as it was found over a third believed that the tutor's role is to provide them with the correct answers and that they can passively learn. Assessment across units needs careful planning as students will prioritise assessment over preparation.

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Appendix A

Certification by Deputy Vice-Chancellor (or equivalent)

I certify that all parts of the final report for this OLT grant provide an accurate representation of the implementation, impact and findings of the project, and that the report is of publishable quality.

Name:Date: