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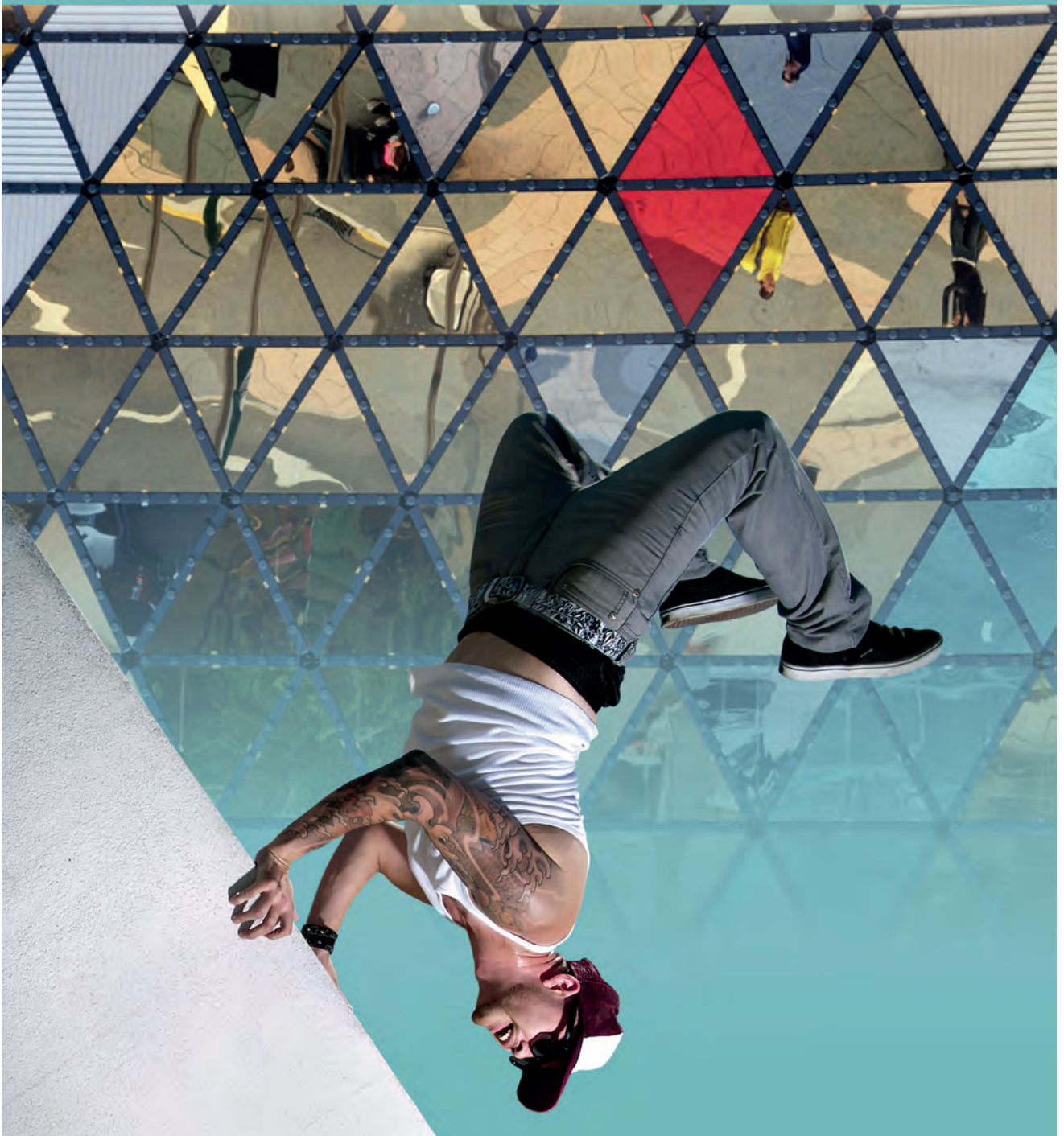


Office for
Learning & Teaching

How to flip a classroom and land on your feet

Workshop – 7 December 2013

www.uq.edu.au/tediteach/flipped-classroom/olt-transforming/



This Workshop is an activity deriving from the project, *Radical transformation: re-imagining engineering education through flipping the classroom in a global learning partnership*, supported by the Australian Government Office for Learning and Teaching.

While support for this activity has been provided by the Australian Government Office for Learning and Teaching, the views expressed in this Workshop do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.



IN COLLABORATION WITH



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Flipping the Classroom Workshop – 7 December 2013

AGENDA

SESSION 1		
9am – 9.30am	Welcome and overview	A/Prof Carl Reidsema
	Discussant	Prof David Radcliffe
SESSION 2		
9.30am – 10.15am	Exploring understandings of flipped classrooms	A/Prof Lydia Kavanagh
SESSION 3		
10.15am – 12noon	Planning a flipped classroom	Dr Abelardo Pardo
12noon – 12.45pm	LUNCH – Level 2 Terrace	
12.45pm – 1pm	Group Photograph. Please assemble in GHD Auditorium, Room 200, entry also from Level 3	
SESSION 4 – Hands-on interactive workshops (Your choice)		
<i>Sign-on lists for the sessions available at Registration Desk at lunch-time</i>		
Time/Location	Workshops	Presenter(s)
1pm – 2.30pm (Room 502)	Supporting the flip	Dr Trish Andrews, Ms Anthea Leggett, UQ Teaching and Educational Development Institute
1pm – 1.45pm and 1.45pm – 2.30pm (Room 316A)	Podcasty stuff: tools for developing video content	Mr Dominic McGrath, UQ Teaching and Educational Development Institute
1pm – 1.45pm and 1.45pm – 2.30pm (Room 316)	Learning analytics	Dr Alan Cody, UQ Centre for Educational Innovation & Technology, Dr Abelardo Pardo, University of Sydney
1pm – 2.30pm (GHD Auditorium, Room 200, entry also from Level 3)	Panel session	Chair: Prof Roger Hadgraft, RMIT University, Prof Caroline Crosthwaite, UQ, A/Prof Lydia Kavanagh, UQ, Prof Phil Long, UQ Centre for Educational Innovation & Technology, Prof David Radcliffe, Purdue University, A/Prof Carl Reidsema, UQ
SESSION 5		
2.30pm – 3.30pm	Reporting back: identifying persistent themes	Prof David Radcliffe
SESSION 6		
3.30pm – 4pm	Close/Summary: The way forward – building on the partnership	Dr Lesley Jolly, A/Prof Carl Reidsema
Post-workshop networking		
4pm – 5pm	Level 5 Terrace	
Buses depart		
5pm	from Jocks Road (see Evacuation Diagram)	



OUTCOMES

At the end of the sessions, participants should be able to:

- define the flipped classroom through a variety of experienced and explored approaches;
- apply a process for designing a flipped classroom within their context;
- access a library of tools, advice, and other resources to support flipped classrooms (and know where to find more); and
- be able to join a Learning Partnership for flipped classrooms where you can share ideas and resources and communicate with others working in this space (Appendix A).





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SESSION 1. Welcome and overview (9am-9.30am)

A/Prof Carl Reidsema will welcome you to the workshop.


We want to begin with what you understand by the term flipped classroom, so we'll be asking:

- What's flipped about a flipped classroom?
- What advantages does it offer?
- Where's the overlap with blended/ online learning?
- What are your most pressing questions?



Throughout the day, you are going to experience flipped classroom approaches that Carl and his team use in their teaching. We highlight these throughout the booklet by using these sticky notes.

We'll display and collect your answers but you may want to capture some thoughts here:



You were all given instructions for Pre-Learning activities (Appendix A). This activity is one of the ways we use to quickly bring those who didn't do it on to the same page as everyone else.

Prof David Radcliffe will comment on responses and offer broad definitions from his experiences.

Appendix C contains a number of references concerning flipped classrooms that may be useful to you.




SESSION 2. Exploring understandings of flipped classrooms (9.30am–10.15am)


A/Prof Lydia Kavanagh will lead a modified deBono Hats¹ session to explore, and make explicit, hopes and fears for flipped classrooms.

Black hat – What are the potential barriers and obstacles?

Work with the group at your table and decide the two biggest problems you have or perceive in moving forward:



Communication between students in flipped classrooms underpins collaborative learning. To ensure there is trust, an exercise such as this makes feelings and preconceptions clear. Shared meaning can then be much more easily developed.



Brain Cloud: This is something developed by Michael Shiel (one of our team) that we use to hear the student voice in large classes. It's engaging, allows an instructor to interact directly with the class, and can be used to collect data for later analysis.


Responses will be collected from each table and displayed electronically using **BrainCloud**.

Time permitting, one of the OLT project partners will respond with examples of how they overcame or avoided problems.

Red hat – How do you feel?

Show either your blue (YES) or orange (NO) card in response to:

- Do you feel daunted at the prospect of flipping the classroom?
- Do you feel pressured into flipping your classroom?
- Do you feel excited with the prospect of flipping the classroom?
- Do you think that you're going to meet resistance from students in adopting a flipped classroom?



You are likely to be surprised at how many people feel just like you. This is a very quick method for gauging the class feeling.

¹ de Bono, E. (1985). Six Thinking Hats: An Essential Approach to Business Management. Little, Brown, & Company



Green hat – What possibilities, alternatives and new ideas does the flipped classroom elicit?

Write your ideas on yellow sticky notes and post them on a poster, in categories if you like, for reference in Session 3 when your group will be planning a flipped classroom.

Yellow hat – What will be the benefits?

Work with the group at your table and decide the two biggest benefits of implementing a flipped classroom.

Responses will be collected and displayed electronically using BrainCloud.

Time permitting, one of the OLT project partners will respond with examples from their own experience.



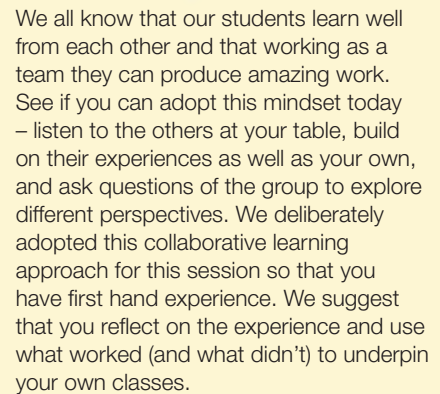
SESSION 3. Planning a flipped classroom (10.15am–12noon)

At the end of this session you should:

- recognise the importance of understanding your context to underpin your flipped classroom design;
- appreciate the need for a structured approach to flipped classroom design;
- appreciate how a collaborative approach to solving a problem works; and
- be able to apply a method for planning a flipped classroom.

Your table will collaboratively produce a flipped classroom plan; to help you with this process, we have produced two diagrams (see following pages):

- **Flipped Classroom Design Considerations** (as discussed by A/Prof Carl Reidsema in the pre-learning podcast): showing how the design fits within the big picture and how this necessarily influences your design; and
- **Bare Bones Model:** summarising the flipped classroom design process that you will work through.



We all know that our students learn well from each other and that working as a team they can produce amazing work. See if you can adopt this mindset today – listen to the others at your table, build on their experiences as well as your own, and ask questions of the group to explore different perspectives. We deliberately adopted this collaborative learning approach for this session so that you have first hand experience. We suggest that you reflect on the experience and use what worked (and what didn't) to underpin your own classes.

SESSION EVALUATION

Dr Lesley Jolly and Prof Roger Hadgraft will be collecting data during this session as 'observers'.

This method of evaluation can be a very useful method of independent data gathering or just as feedback to improve the effectiveness of your class.

If you want a more detailed evaluation of your classroom, you might consider using a specific instrument such as the Teaching Dimensions Observation Protocol (TDOP)², the Classroom Environment Inventory of student perceptions³, the ASSIST instrument⁴, or an adaptation of these.

Appendix D contains our data collection and evaluation plan for ENGG1200 as an example of what you might include.

2 Hora, M., & Ferrare, J. (2010). The Teaching Dimensions Observation Protocol (TDOP). Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research.

3 Fraser, B. (1998). Classroom environment instruments: development, validity and applications, *Learning Environments Research*, 1, 7-33.

4 Entwistle, N. J. (2009). *Teaching for Understanding at University Deep Approaches and Distinctive Ways of Thinking*. New York, N.Y.: Palgrave Macmillan

Diagram: Flipped Classroom Design Considerations

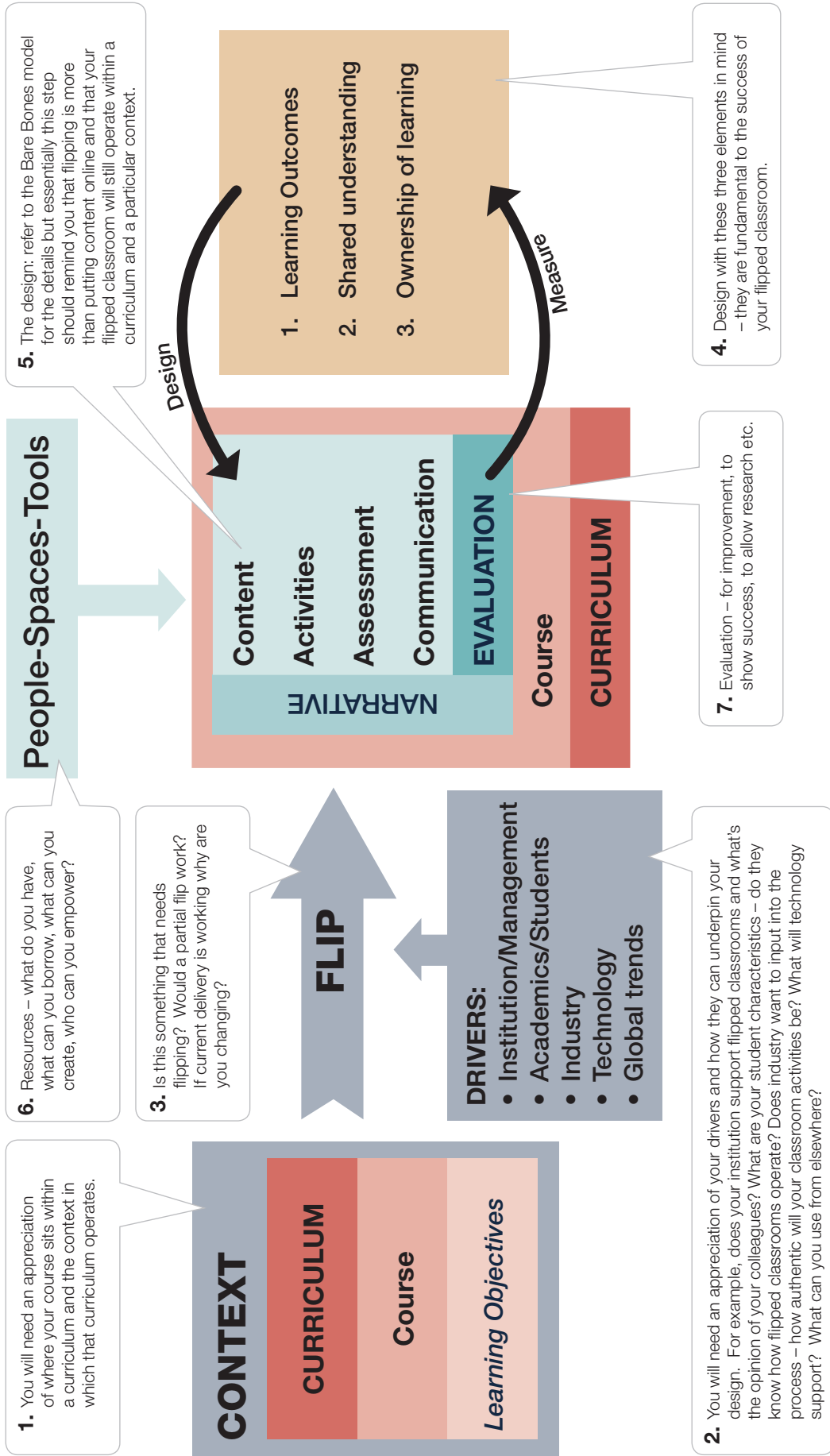




Diagram: Bare Bones Model

NARRATIVE

LEARNING OBJECTIVES

What do your students need to know and do, and to what level?

CONTEXT

Design with your students, curriculum, resource availability, and external drivers in mind



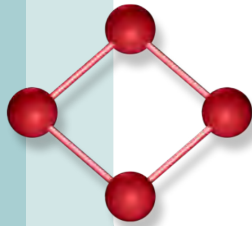
1. Independent (Pre-) Learning

- What information do your students need?
- How will students access this content?
- Is there any preparation for the active session?
- Do you need to ensure students to complete the pre-learning?
- What resources do you need?



2. Engaged Learning in Class

- What kinds of activities will develop student learning?
- How will you foster intra-class communication?
- What is the driver for students to attend the session?
- How will students demonstrate their learning and you evaluate success of your flipped classroom? (What evidence will you gather?)



3. Integration

- What relates all the learning activities together?
- Is there an activity, tool or resource that reminds the students how it hangs together?
- How does this class serve the course learning outcomes?



4. Reflection

- Did you facilitate effectively?
- Did the students achieve ownership of learning?
- Is there a shared understanding of meaning?

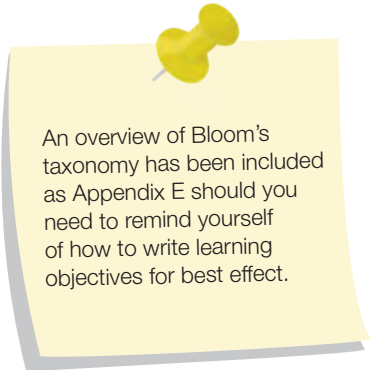
EVALUATION



Step 0: Topic, learning outcomes, and context

Choose a topic for your flipped class from the following:

1. Reflective practice
2. Professional writing
3. Teamwork
4. Leadership
5. Information Management



Write at least two learning objectives for the class.

Decide your context (choose an option for each category):

Students	Number in cohort:	60	150	300
	% International:	10	20	30
	Year level:	First year	Later year - undergraduate	Postgraduate
	Mode:	On campus	Distance	Both
	Experience with flipped classrooms:	None	Some	Lots
Curriculum	Integration:	New topic – taught once	New topic - fundamental	Done before – next level
	Relevance of topic to industry:	Low	Medium	High
Institution	Attitude towards flipping:	Non-committal	Supportive	Mandated
People	Who have you got?	Just you really	You + shared team	Full team + Ed. designers
Spaces	What have you got?	Lecture + tutorial rooms	Flat floor spaces	Laboratories + studios
Tools	What have you got?	Fundamentals	Limited funding	Funding to develop stuff

Other categories/considerations:



Step 1: Independent (pre-) learning

What do your students need to know?

What are the information needs?

How will your students access this content (e.g. podcasts, readings etc.)?

Will they do any preparatory activities other than accessing the content?

Do you need to do something to ensure that they do the pre-work?

What resources will you need? (Can the class itself generate any of them?)

You might also like to consider:


- Is it important that everyone does it?
- What happens if students don't do it?
- Will you assess it?
- How will you communicate its importance to students?



Step 2: Engaged learning in class

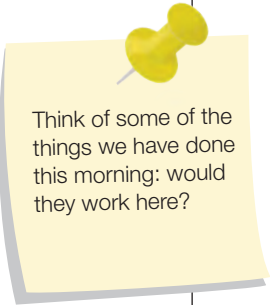
What do students need to DO to learn what you want them to learn?

What in-class activities are you going to employ to help your students achieve the learning objectives?



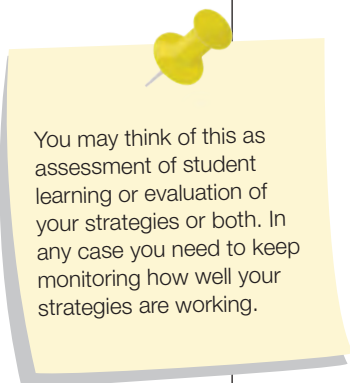
Refer to the poster of sticky notes that you made in Session 2 (Green Hat).

How will you foster intra-class communication?



Think of some of the things we have done this morning: would they work here?

How will students demonstrate their learning?




You may think of this as assessment of student learning or evaluation of your strategies or both. In any case you need to keep monitoring how well your strategies are working.



STEP 3: Integration


How will students develop a narrative around the session that helps them contextualise what they have learnt?

What relates all the learning activities together? Is there an activity, tool or resource that reminds the students how it hangs together?



Different types of learning activities, carried out in disparate settings and in disparate ways, can easily seem incoherent to a student. What will you do to provide structure and coherence in your flipped classroom? How will students make meaning of the session aims?

How does this class serve the course learning outcomes?

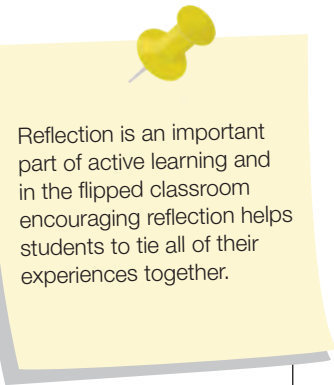


An important question to ask, but perhaps one that's difficult to answer here as you have just designed a flipped class based on a topic rather than on a course or curriculum.



STEP 4: Reflections

1. Reflect as a table on your flipped classroom plan and produce a summary diagram or list of points on your flip chart that you can share with the rest of the room in Session 5.



2. What are your own 'take-home' messages from this exercise? (These also will be discussed in Session 5.)

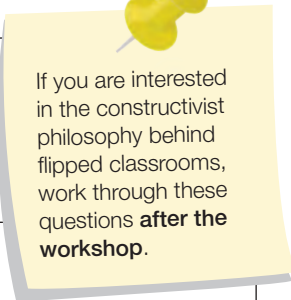


SIDEBAR 1: Rethinking your role as an educator: moving from lecturer to facilitator

Addressing basic assumptions⁵:

- A: Knowledge is complex and socially constructed.
- B: Self is central to knowledge construction.
- C: Expertise and authority are mutually shared among peers in knowledge construction.

a) In what ways are these assumptions currently evident in your selected area of practice?



If you are interested in the constructivist philosophy behind flipped classrooms, work through these questions **after the workshop**.

b) How could you more effectively convey these assumptions to learners in your selected context?

Flipped Classrooms seek to encourage active, engaged and experiential learning and Baxter Magolda and King (2004) posit a number of principles that provide guidelines for making that happen.

Connecting assumptions to learner's ways of making meaning:

- A: Validate students ability to know.
- B: Situate learning in learners' experience.
- C: Mutually construct meaning with learners.

a) In what ways are these principles currently evident in your selected area of practice?

b) How could you more effectively convey these principles to learners in your selected context?

⁵ Baxter Magolda, M. and King, P.M., (2004). Learning Partnerships: Theory and models of practice to educate for self-authorship, Stylus Publishing, Virginia USA



SIDEBAR 2: Examine learner characteristics from a flipped classroom perspective

As well as considering your own role in the flipped classroom it's important to consider what your students bring to the experience in terms of existing skills and attitudes.

Describe the likely learning capacities of target students and consider the implications for your flipped classroom design. What underlying assumptions about knowledge, self and working relationships do they hold?

Cognitive: What way of constructing knowledge does the cohort commonly use? Is this the same or different from what students will do in the Flipped Classroom?

Individual: How do students understand their own role as learners? What are their expectations of the class likely to be? What kind of issues is this likely to raise for the Flipped Classroom approach?

Group: How highly do students rate peer learning and collaboration? Will you have to introduce them to this method of learning and prove its value?



SESSION 4. Hands-on, interactive tool workshops and panel sessions (1pm–2.30pm)



Try out some of the tools for running flipped classrooms or have a more in-depth discussion with the research partners. Copies of the materials used will be posted to the Learning Partnerships website.

Time/Location	Workshops	Presenter(s)
1pm – 2.30pm (Room 502)	Supporting the flip	Dr Trish Andrews, Ms Anthea Leggett, UQ Teaching and Educational Development Institute
1pm – 1.45pm and 1.45pm – 2.30pm (Room 316A)	Podcasty stuff: tools for developing video content	Mr Dominic McGrath, UQ Teaching and Educational Development Institute
1pm – 1.45pm and 1.45pm – 2.30pm (Room 316)	Learning analytics	Dr Alan Cody, UQ Centre for Educational Innovation & Technology, Dr Abelardo Pardo, University of Sydney
1pm – 2.30pm (GHD Auditorium, Room 200, entry also from Level 3)	Panel session	Chair: Prof Roger Hadgraft, RMIT University, Prof Caroline Crosthwaite, UQ, A/Prof Lydia Kavanagh, UQ, Prof Phil Long, UQ Centre for Educational Innovation & Technology, Prof David Radcliffe, Purdue University, A/Prof Carl Reidsema, UQ

Sign-on lists for the hands-on sessions available at Registration Desk at lunch-time.

NOTES:




SESSION 5. Reporting back (2.30pm–3.30pm)

We will begin with getting some of you to report back on your Session 3 outcomes for:

- your flipped classroom plan; and
- your 'take-home' messages.

Then Prof David Radcliffe will draw together what has gone before and identify themes to be carried forward.

NOTES:



This session has been designed to be fairly flexible. We recommend this approach if you're at all unsure of your audience's level of understanding and/or needs. If you explicitly tell your students that this is what you've designed for and that you will take their wishes on board, they will feel that they have much greater ownership.



SESSION 6. Close/Summary (3.30pm–4pm)

We will begin here with an Observer report of the day's proceedings from Dr Lesley Jolly.

And proceed to the closing of the workshop by A/Prof Carl Reidsema who will outline how we envisage taking this forward and how the learning partnership (see Appendix B) fits in.

NOTES:



We recommend that you allow at least a few minutes at the end of any session to wrap it up with take home messages and a summary of proceedings. Students leave with a much clearer idea of what has happened and what they have learnt.

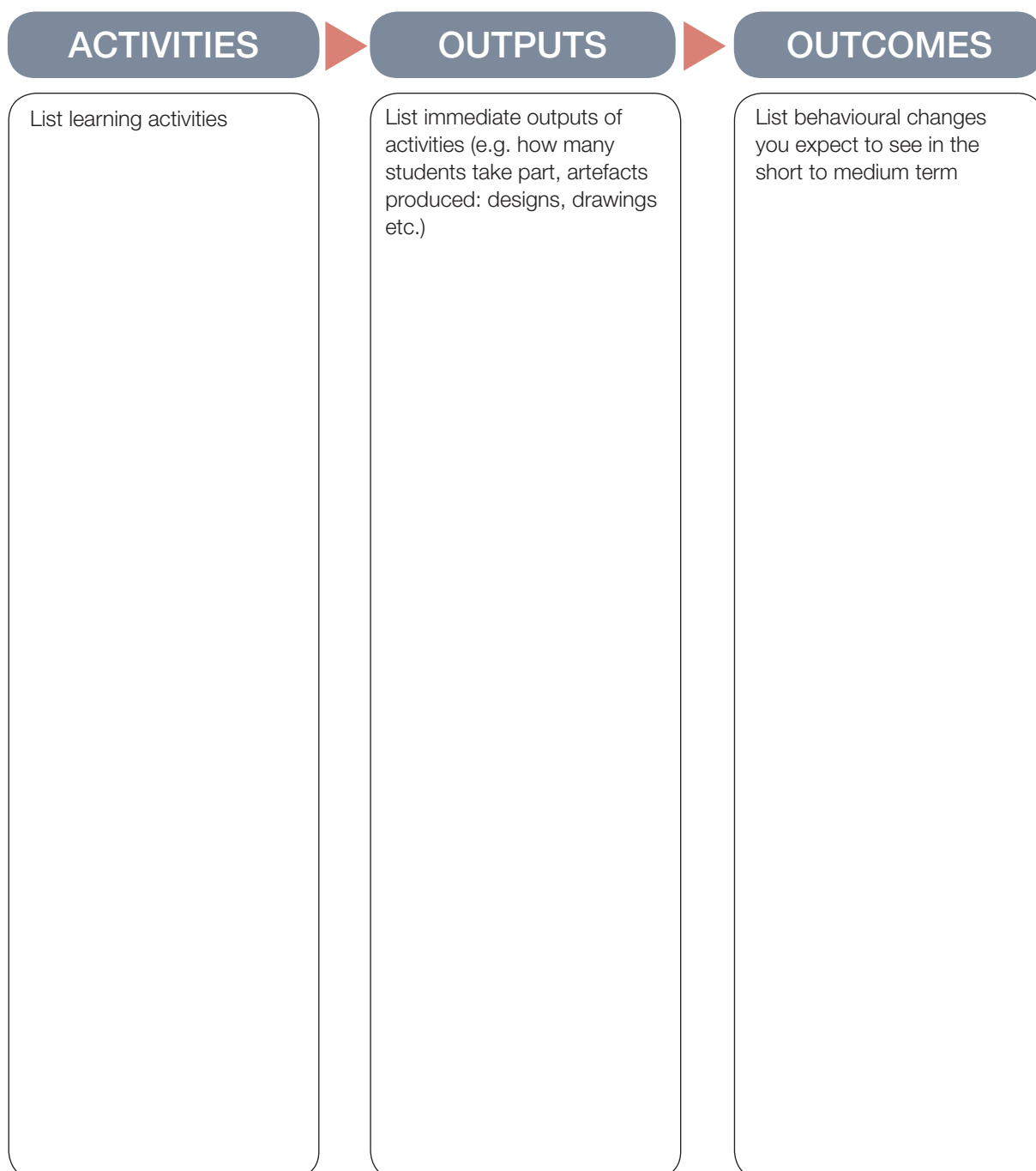


SIDEBAR 3: Evaluating your flipped classroom

You are going to want to gather evidence about how well your flipped classroom works. We have prepared a podcast that takes you through what you need to do to gather this evidence. It can be found by following the appropriate links from:

<http://www.uq.edu.au/tediteach/flipped-classroom/olt-transforming/evaluation.html>

Step 1: Describe the logic of how your class is meant to attain the learning outcomes. This will allow you to identify indicators of success.



Review your plan and make sure that the logic of Activity -> Output -> Outcome holds up.



Step 2: Decide what will count as evidence of success. You can choose to examine outputs or outcomes or both.

Output Evidence			
Nature of evidence (e.g. attendance, draft scripts, online activity, etc.)	Source of evidence (e.g. rolls, routine assessment, webpage logs etc.)	Frequency and timing of collection	Who will collect evidence

Outcome evidence			
Nature of evidence (e.g. change of attitudes, developing skills etc.)	Source of evidence (e.g. observations, interviews, focus groups, surveys etc.)	Frequency and timing of collection	Who will collect evidence



Step 3: Judging the evidence

Consider the following aspects with respect to success: how will you use the evidence, and what will count as success for you. The questions⁶ are generic and may need modification in light of your goal(s).

Appropriateness: How appropriate was the flipped classroom for your context?

Effectiveness: To what extent were short to medium term goals achieved?

Impact: What were the consequences of making the change? Don't forget to look outside your context (e.g. student performance in other courses).

Efficiency: Could the outcomes have been achieved with less effort and expense? Are there areas where similar outcomes can be achieved?

Sustainability: What needs to be done to ensure that the change can be embedded in normal practice?

⁶ These issues are explained in the podcast on the Learning Partnership website (see Sidebar 3).



APPENDIX A: Pre-Learning



Resources were provided for you to engage with content and prepare before class. This then enabled us to flip the workshop.

Podcasts were giving an overview of one team’s approach to flipping the classroom at:

<http://www.uq.edu.au/tediteach/flipped-classroom/olt-transforming/preWork.html>

In addition you were asked to review at least three resources in the following list (and find another two resources) and select the main idea obtained from the resource and the aspect that applies to your context .

Resource	Main idea obtained from the resource	Aspect to apply to your context
The Flipped Classroom (Infographic)		
Can you flip large classes? (Article)		
What is a flipped classroom? (in 60 seconds) (Video)		
Flip your class with proven methods (Video)		
Flipping the Classroom - Simply Speaking (Video)		
The Flipped Classroom: An Innovative Approach to Student Engagement (Article)		
Flipped Classroom (Infographic)		
First experience of a flipped learning approach (Case study)		
The 2 most powerful flipped classroom tips I have learned so far (Article)		
Two other resources found to be useful	Main idea obtained from the resource	Aspect to apply to your context



APPENDIX B:

The Learning Partnership

The OLT Project: ID13-2840 **“Radical transformation: re-imagining engineering education through flipping the classroom in a global learning partnership”** currently draws on the expertise of six US and Australian universities and has as its primary aim, fast tracking the dissemination of curriculum innovation through a Global Learning Partnership (GLP) by sharing (through transparent practices) our co-development efforts with the Flipped Classroom.

The partnership has at its heart, the idea that open/transparent collaboration and sharing of data and methods is a different (and potentially more powerful) mechanism for dissemination and transfer of practice than is typical of academic publications.

We are inviting you to join this learning partnership. With your help we aim to:

- develop knowledge about and from flipped classrooms and,
- disseminate those findings through a community of practice, collaborative publications and further research and development grants.

Here’s how it will work.

We draw on Baxter Magolda’s (2012) principles of Learning Partnerships (see Sidebar 1, page 16)

1. Knowledge is socially constructed

This means we can create better knowledge together, sharing our expertise and pooling our authority.

2. We have to respect and validate what learners know

In the Partnership everyone gets to make their contribution, knowing they will be listened to respectfully.

3. Learning has to be situated in learners’ experience

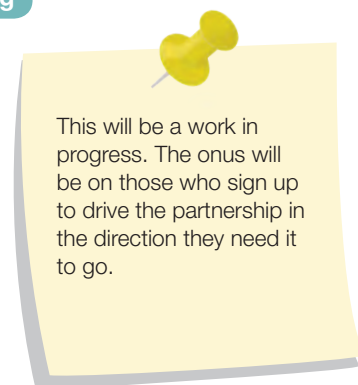
By sharing a wide range of different experiences we can broaden our understanding but also make more sense of what we are doing.

4. Meaning is mutually constructed

Open communication amongst the Partnership will help us all to refine our understandings and better communicate our intent.

If all of this sounds like something you want to be part of, go to the following website and sign on to become a learning partner. We look forward to working with you there.

<http://www.uq.edu.au/tediteach/flipped-classroom/olt-transforming>





APPENDIX C:

Resources relevant to flipped classrooms

Alpay, E., & Gulati, S. (2010). Student led podcasting for engineering education. *European Journal of Engineering Education*, 35, 415–442.

Baker, J. W. (2000). The “Classroom Flip”: Using web course management tools to become the guide by the side. In J. A. Chambers (Ed.), *Selected Papers from the 11th International Conference on College Teaching and Learning* (pp. 9-17). Jacksonville: Florida Community College.

Bland, L. (2006, June). Applying flip/inverted classroom model in electrical engineering to establish lifelong learning. *Paper presented at the meeting of the American Society for Engineering Education*, Chicago, IL.

Bolliger, D. U., Supanakorn, S., & Boggs, C. (2010). Impact of podcasting on student motivation in the online learning environment. *Computers & Education*, 55, 714–722.

Brown, A. F. (2012). A phenomenological study of undergraduate instructors using the inverted or flipped classroom model. Doctor of Educational Technology dissertation, Pepperdine University.

Chester, A., Buntine, A., Hammond, K., & Atkinson, L. (2011). Podcasting in education: Student attitudes, behaviour and self-efficacy. *Journal of Educational Technology & Society*, 14, 236–247.

Cole, J. E., & Kritzer, J. B. (2009). Strategies for success: Teaching an online course. *Rural Special Education Quarterly*, 28(4), 36-40.

Crippen, K. J., & Earl, B. L. (2004). Considering the effectiveness of web-based worked example in introductory chemistry. *Journal of Computers in Mathematics and Science Teaching*, 23, 151–167.

Felder, R. M., & Brent R., (1997). Objectively Speaking, *Chemical Engineering Education*, 31(3), 178-179.

Fernandez, V., Simo, P., & Sallan, J. M. (2009). Podcasting: A new technological tool to facilitate good practice in higher education. *Computers & Education*, 53, 385–392.

Foertsch, J., Moses, G. A., Strikwerda, J. C., & Litzkow, M. J. (2002). Reversing the lecture/homework paradigm using eTeach web-based streaming video software. *Journal of Engineering Education*, 91, 267–274.

Fulton, K. (2012). Upside down and inside out: Flip your classroom to improve student learning. *Learning & Leading with Technology*, 39(8), 12–17.

Gannod, G. C., Burge, J. E., & Helmick, M. T. (2008). Using the inverted classroom to teach software engineering, Report No. MU-SEAS-CSA-2007-001, Oxford, OH: Miami University.

He, Y., Swenson, S., & Lents, N. (2012). Online video tutorials increase learning of difficult concepts in an undergraduate analytical chemistry course. *Journal of Chemical Education*, 89, 1128–1132.

Holbrook, J., & Dupont, C. (2010). Making the decision to provide enhanced podcasts to post-secondary science students. *Journal of Science Education and Technology*, 20, 233–245.

Kay, R., & Kletschin, I. (2012). Evaluating the use of problem-based video podcasts to teach mathematics in higher education. *Computers & Education*, 59, 619–627.

Ladner, B., Beagle, D., Steele, J. R., & Steele, L. (2004). Rethinking online instruction. *Reference & User Services Quarterly*, 43(4), 329-337.



Lage, M. J., & Platt, G. (2000). The Internet and the Inverted Classroom. *Journal of Economic Education*, 31(1), 11.

Lage, M. J., Platt, G., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education*, 31(1), 30-43.

Lippmann, S., Bulanda, R. E., & Wagenaar, T. C. (2009). Student entitlement: Issues and strategies for confronting entitlement in the classroom and beyond. *College Teaching*, 57(4), 197-204.

Lonn, S., & Teasley, S. D. (2009). Podcasting in higher education: What are the implications for teaching and learning? *Internet and Higher Education*, 12(2), 88–92.

McCombs, S., & Liu, Y. (2007). The efficacy of podcasting technology in instructional delivery. *International Journal of Technology in Teaching and Learning*, 3(2), 123–134.

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Overmyer, J. (2012). Flipped classrooms 101. *Principal* (September/October), 46–47.

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APPENDIX D: Project brief – Evaluation of ENGG1200



This real evaluation brief is offered here as an example of what you might do.



The Curriculum Experience in ENGG1200 Engineering Modelling & Problem Solving

Project Brief – July 2013

EURef: #213

Background

ENGG1200 Engineering Modelling & Problem Solving is innovative Faculty course providing an introduction to a) *engineering problem solving* through the relationship between theoretical, mathematical and computational modelling for predicting design performance, and b) *the properties, and behaviours of engineering materials in design*. Students engage in a major team based multidisciplinary design project to develop first phase virtual and second phase physical prototype solutions.

The subject is designed to build on the lessons of ENGG1100 and also to develop students in new directions: problem solving, simulation as a design tool, and understanding materials. ENGG1200 is built around online learning and active learning through the team design projects. The former requires students to manage their own learning and the latter involves them in the next steps in design: modelling and simulation. The primary technical learning outcomes will be addressed through a combination of online learning activities and hands-on collaborative tutorials and laboratories. Students require good project management, teamwork, information literacy, and communication skills to perform well. The skills and knowledge that are delivered as part of ENGG1200 aim to underpin future studies and engineering careers of students.

The course adopts a ‘flipped classroom’ approach. There are very few lectures in ENGG1200 as students are expected to learn in their own time and space via online learning modules, and collaboratively with their team in weekly workshops. Lectures are therefore designed to showcase how the things that students are learning about are relevant and necessary in the life of a professional engineer. Students meet as a team of approximately six students each week under the guidance of engineering staff and tutors to tackle the multi-disciplinary design-simulate-prototype-build project. They are able to nominate a preference for system behavioural modelling using MatLab simulation software or structural modelling and CNC machining of a system component using Creo computer aided design software. The semester concludes with a demonstration where teams are given a chance to test both prototype and simulations in a competitive environment.

The course is being presented for the second time in S2 2013 to 1101 students. The approach of the Course Coordinators, Associate Professor Lydia Kavanagh and Dr Carl Reidsema, in developing and implementing the course was *participatory* – they were open with students (N = 993) that this was a new approach and a new model of learning in the engineering school. They asked students to take an open-minded ‘problem-solving’ approach to the implementation of this large-scale enquiry based learning approach. This innovative approach to course implementation, referred to as a ‘flipped classroom’, by the Coordinators, received mixed evaluations from students. Students, while finding the course intellectually stimulating (64% agree), that learning materials assisted them in the course (49% agree), that they received helpful feedback, and that they learned a lot (56 % agree), gave average overall scores (only 23% agree). Problem areas were understanding the aims and goals of the course, course structure, and clarity of assessment requirements.

The Evaluation Unit (EU), TEDI, was approached to evaluate the curriculum experience in ENGG1200’s ‘flipped classroom’ environment – to explore what is really happening at the planning, implementation and attainment stages for stakeholders. This project provides the Faculty and TEDI



the opportunity to observe and understand what is occurring in a large group ‘flipped classroom’ approach being run in a range of learning spaces across the campus. This evaluation will form part of an ‘umbrella project’ – a broader enquiry into the ‘flipped classroom’ method being implemented across the university. The survey instrument developed for this project will be used in this ‘umbrella’ project and the results will contribute to a growing body of knowledge and shared experience on this pedagogy at UQ.

Stakeholders

- Course Coordinators, teachers and tutors in ENGG1200, tutors,
- Faculty/School Teaching and Learning Committees
- Enrolled Engineering students
- TEDI Evaluations (testing of SECaT, development of observation instrument)
- DVCA/ADAs

Evaluation Approach

This evaluation examines the curriculum of ENGG1200 across 3 levels: what is planned for the students, what is delivered to the students, and what the students experience (Prideaux, 2003). These components have also been described as the intended, implemented and attained curriculum (Van den Akker, Kuiper, & Hameyer, 2003). This evaluation approach uses a mixed method approach to understand what is really going on for stakeholders (enrolled students, tutors, lecturers, coordinators) at the planning, implementation and attainment levels of curriculum.

Research question

The research question to be addressed by this evaluation:

What is the curriculum experience of ENGG1200 for stakeholders?

In order to answer this broad question, the following questions will need to be answered.

1. What is happening at the **planning** level?
 - a. What is planned?
 - b. What is being changed in light of last year’s feedback?
 - c. What are the key learning outcomes: both articulated and intended?
 - d. How are plans being communicated to stakeholders?
2. What is happening at the **implementation** level?
 - a. Is what is planned to happen actually happening?
 - b. Are the stakeholders engaged in the implementation and what does this engagement look like?
 - c. Is the “flipped classroom” approach enacted as anticipated across all anticipated spaces?
3. What is happening at the **attainment** level?
 - a. Did the ‘flipped classroom’ approach achieve the student learning outcomes it was designed to achieve?
 - b. Did students evaluate the course positively?

Evaluation Outline

A multi-phase evaluation approach has been adopted to answer the proposed research questions. Each phase draws on multiple data sources and analysis processes. These are described below in detail



What is happening at the planning level?

1. Course Profile Development

Course profile documentation in the ECP will be reviewed by EU staff and a course profile developed. This profile will be confirmed with course coordinators

2. Theory of Change interviews

Semi-structured interviews will be conducted with Course Coordinators to understand and record the planned approach and any planned changes to implementation. Interviews will use the “theory of change” template (Hart, Diercks-O'Brien, & Powell, 2009) to determine planned and intended theory of change. These interviews will be conducted in week 2

What is happening at the implementation level?

1. In-class observations

- a. One informal observation in Week 2 will gather information on flipped classroom method used in this instance in order to inform the development of a formative observation tool for the “Flipped Classroom”. The tool draws on the systematic observation procedure developed by Hora and Ferrare (2010) which has been refined to focus on observable behaviours anticipated in students and teachers in a flipped class environment.
- b. Four further observations will take place across the semester and across teaching spaces using the Flipped Classroom observation tool. Independent observers will be trained to use the observation tool developed.

2. Interviews with teaching staff

Interviews will be conducted with course coordinators, teachers and tutors to gather perceptions on implementation. EU project staff will organise and conduct pre-semester and in-semester interviews with Course Coordinators, teachers and tutors.

What is happening at the attainment level?

1. Pre-survey

A paper-based pre-survey of students will be conducted to determine student expectations of the course based on current understanding will be conducted in lecture 1. This survey will also gather information of preferences for teaching styles and student understanding of design principles that will be used in the assessment of the implementation and attainment. The survey will be developed by EU staff and administered by Faculty staff.

2. Summative student perception survey

A paper-based post-test survey consisting of SECaT items, SETQL questions on elements of preference (Entwistle, 2009), and open-ended questions on student understanding of design principles will be conducted with students in the penultimate lecture in Week 12

3. Learning analytics

Secondary data will be gathered to assess how well recorded attainments mapped to course learning outcomes. Data includes

- a. Blackboard analytics of individual reflections developed by the CEIT team working on this aspect,
- b. assessment items (module quizzes and peer assessments),
- c. downloads and participation in forums;
- d. mid-semester and end of semester results; and
- e. attendance records



4. In-class opinion polls

Using student smart devices and soapbox, a web-based polling tool, opinion polls will be used at two points during the semester to gauge student perceptions of aspects of anticipated outcomes being met.

5. Focus groups

Focus groups will be conducted in mid semester with eight complete student project teams (two project teams per focus group) across the four available project topic areas:

- a. Project A: Payload deployment-mechanism,
- b. Project B: Chemical Process Control System;
- c. Project C: Failure Aware Power Line Support; and
- d. Project D: Core Drilling Strata Detection .

The focus of this data collection activity is to understand cooperative learning strategies used from a student perspective. A Focus Group Discussion Guide will be developed for use in focus groups.

Analysis

Each data set will be analysed using appropriate data analysis techniques.

A realist synthesis process will be used to map the theory of change process across the different data collected to

- a. map the actual practice against the intended
- b. ascertain the underlying causal mechanism to understand what aspects of the curriculum are working for whom

Reporting

Technical reports will be produced for each of the data collection strategies and returned to the course coordinators to distribute and act on as relevant

A full final synthesis report will be developed.

Final Report Audiences

- Course coordinators and teaching staff
- ADA of relevant Faculty

Quotation

Catering for focus groups and incentives for participation in the focus groups are expected to be met by the Faculty. Signing acceptance of the project brief is viewed as acceptance of the quoted costs.

Item	Cost
Focus group catering	\$ 270.00
Focus group vouchers (\$30 x 48 participants)	\$1440.00
GRAND TOTAL	\$1710.00



Project Timeline

DUE DATE	ACTIVITY	RESPONSIBLE	STATUS
JULY			
20 July 2013	Finalise Pre-Test Survey	EU/Faculty	
22 July 2013	Finalise Ethics Clearance	Faculty	
22 July 2013	Conduct Pre-Test Survey (Week 1)	Faculty	
26 July 2013	Finalise course profile	EU	
29 July 2013	Observation 1 (Week 2)	EU	
29 July 2013	Interview with course coordinators	EU	
AUGUST			
2 August 2013	Finalise which classes will be observed	EU/Faculty	
5 August 2013	Deliver Technical Report – Pre-test Survey	EU	
5 August 2013	Finalise Opinion Poll 1	EU	
9 August 2013	Finalise the interview schedule with teaching staff	EU	
9 August 2013	Invitation to participate in interviews and focus groups sent	EU	
9 August 2013	Finalise Focus Group Discussion Guide and focus group times	EU	
16 August 2013	Finalise Observation Tool	EU	
19 August 2013	Conduct opinion poll 1 in large class lecture	Faculty	
19 August 2013	Focus group selection email sent to selected participants	EU	
26 Aug – 31 August	Conduct 4 x Focus Groups	EU	
SEPTEMBER			
2 September 2013	Finalise Opinion Poll 2	EU	
2 September 2013	Opinion poll 1 – Technical Report	EU	
23 September 2013	Conduct opinion poll 2 in large class lecture	Faculty	
OCTOBER			
14 October 2013	Summative Survey (Week 12)	EU/Faculty	
28 October 2013	Finalise Interview Technical Report	EU	
NOVEMBER			
5 November 2013	Opinion poll 2 – Technical Report	EU	
22 November 2013	Finalise Observations Technical Report	EU	
DECEMBER			
5 December 2013	Survey report completed	EU	
6 December 2013	Collate all learning analytics data	EU	
JANUARY			
3 February, 2014	Deliver Focus Group Technical report	EU	
FEBRUARY			
MARCH			
3 March, 2014	Full Report	EU	

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It is expected that should these data be used in a formal report and/or an esteemed research output, such as a journal article, authorship recognition will include Deanne Gannaway, Ellen Dearden and Karen Sheppard in accordance with the Australian Code for the Responsible Conduct of Research.

Acceptance:

Name: Associate Professor Carl Reidsema
Director of Teaching and Learning (Engineering)
Faculty of EAIT, University of Queensland
Phone: (07) 3365 3596
c.reidsema@uq.edu.au

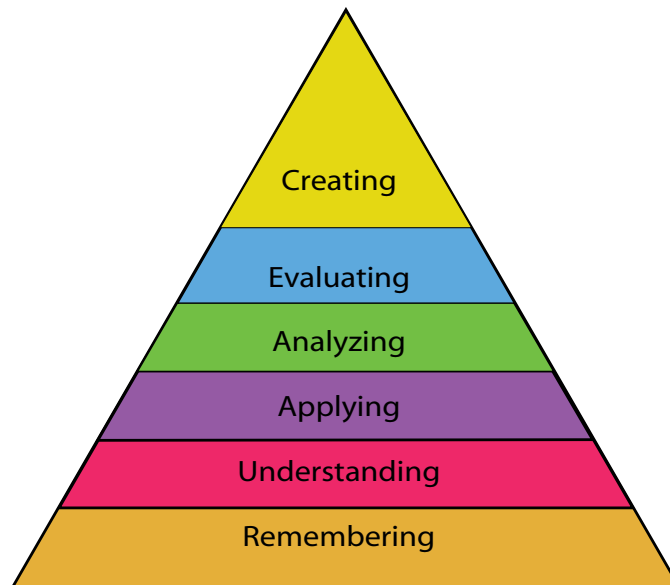
Signature:  Date: 29/07/13 _____

Please return acceptance with signature as indication of your approval



APPENDIX E: Bloom’s Taxonomy – an overview⁷

Revised Bloom’s Taxonomy



Levels of Knowledge	Action Verb
Remembering: Can the student recall or remember the information?	Key Words: define, duplicate, list, memorize, recall, repeat, reproduce, state
Understanding: Can the student explain ideas or concepts?	Key Words: classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase
Applying: Can the student use the information in a new way?	Key Words: choose, dramatize, demonstrate, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write
Analyzing: Can the student distinguish between the different parts?	Key Words: appraise, compare, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test
Evaluating: Can the student justify a stand or decision?	Key Words: appraise, argue, judge, defend, select, support, value, evaluate
Creating: Can the student create a new product or point of view?	Key Words: assemble, construct, create, design, develop, formulate, write

http://www.odu.edu/educ/roverbau/bloom/blooms_taxonomy.htm

⁷ Taken from: University of South Carolina (No date). A Faculty and Staff Guide to Creating Learning Outcomes. Available at: <http://www.sc.edu/cte/guide/doc/learningoutcomesbrochure.pdf>



Housekeeping

Toilets

Male and female toilets can be found on all levels of the Advanced Engineering Building. Level 3 facilities are situated diagonally to the left, behind the lifts, as you exit the main workshop room (Room 301/302).

Smoking

The Advanced Engineering Building is a non-smoking venue. If you would like to smoke, please make your way outside onto Staff House Road or Jocks Road.

Transportation

The complementary buses to Surfers Paradise, Brisbane CBD and Brisbane airport will depart from Jocks Road outside the Advanced Engineering Building, the Workshop venue, at approximately 5.00pm.

Luggage storage facilities will be provided at the venue. Check luggage in at Registration Desk.

If you wish to use public transport for your departure, bus stops, ferry stops and taxi ranks are shown on the St Lucia campus map at:

www.uq.edu.au/maps/pdf/StLuciaMap.pdf

Due to roadworks, the Chancellors Place bus stops have moved to nearby temporary stops, see **www.pf.uq.edu.au/project-bb.html#chancellorsplace**

To find your best route, log onto the Translink journey planner at **www.translink.com.au**

Alternatively, Yellow Cabs can be contacted on 13 1924 or Black & White Cabs on 13 1008. Your pick-up location is the corner of Jocks Road and Staff House Road, UQ St Lucia campus.

Directions on campus

The **UQnav app** is a free, mobile application that will help you navigate around the UQ St Lucia campus. It can be downloaded onto Apple or Android devices.

Internet access

We recommend that you bring your own device (laptop/tablet/smart phone) where possible to access the internet during the Workshop. If you have Eduroam access, authentication may not work automatically, so please refer to:

www.its.uq.edu.au/services/wireless-network for information about Eduroam at UQ, prior to your arrival.

An IT Officer and some student assistants will be on hand at the Workshop to assist you.

Emergency Evacuation for Advanced Engineering Building (Building 49, UQ St Lucia campus)

The Flipped Classroom Workshop is being held on Level 3 of the Advanced Engineering Building. An evacuation plan is provided inside the back cover of this Workbook.

In the unlikely event that an emergency situation should arise, please remain calm and follow instructions provided by the Workshop leaders.

If the emergency alarm is activated, two tones may be heard:

- BEEP BEEP BEEP is the Alert tone
- WOOP WOOP WOOP is the Evacuate tone

If an alert tone (beep beep beep) sounds, it is a warning that investigation of a potential situation is underway. Wait for further instructions. It is recommended that you prepare your immediate area for safe evacuation.

If an evacuation tone (woop woop woop) is heard, please follow instructions of the Workshop leaders. Ensure room doors are closed after exit, and move promptly to the evacuation meeting point, which is the grassed amphitheatre on the other side of Jocks Road above the Lake. Please ensure that you do not leave this meeting point area, so that you can be accounted for by emergency services and organisers.

In an emergency situation, do not use the lifts. Remember that your safety is more important than property or possessions.

UQ Security Emergency Number – (07) 3365 3333, UQ Security coordinates all emergency responses.

BUILDING EVACUATION DIAGRAM

Available online at www.pf.ucl.edu.au

LEGEND

- | | | | |
|--|---------------------|--|---------------------|
| | Exit Paths | | First Aid |
| | Exit Stairs | | Breathing Apparatus |
| | Manual Call Point | | Safety Shower |
| | Fire Hose Reel | | Eye Wash |
| | Fire Hydrant | | Spill Kit |
| | Fire Extinguisher | | Defibrillator |
| | Fire Blanket | | |
| | Wardens Phone | | |
| | Emergency Shut Down | | |

IN CASE OF FIRE & EMERGENCY

R REMOVE persons from immediate danger

A ALERT UQ Security (Tel 5 3333 or 3365 3333)

A ACTIVATE Manual Call Point (if nearby)

C CONFINE the Fire & Smoke

C CLOSE Doors & Windows (if safe to do so)

E EVACUATE to the

Assembly Area shown below

Mobility Impaired Persons should evacuate

IMMEDIATELY on hearing the alarm with

assistance from a nominated person.



Follow Fire Warden Instructions
Do NOT use lifts



49 ADVANCED ENGINEERING BUILDING

Level 3

Revised 04/06/2013



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

OLT Flipped Classroom Project

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Web: www.uq.edu.au/tediteach/flipped-classroom/olt-transforming/