

TDG Project Dissemination:

Using learning principles to foster constructivist epistemic beliefs for theory- practice integration: Results and Reflection

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Objective

A TDG project to evaluate the effectiveness of pedagogy with mixed methods.

Quantitative repeated measurements:

- Change in epistemic beliefs
- Change in conception of teaching

Qualitative methods:

- In-depth interview with students to identify critical incidents in the learning environment

Results



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How People Learn



Brain,



Mind,



Experience,

and

School



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Summary of cross-disciplinary research
on human learning:

- How do people best learn?
- How should we then design our
learning environment accordingly?

How people learn (Bransford & Cocking, 2000; Swayer, 2010)

Principle 1: Activating prior knowledge

- It highlights the importance of learners' prior knowledge, that learning means a successful bridging of new knowledge to one's existing knowledge.

Principle 2: Developing metacognitive abilities

- It highlights the importance of not just teaching the content, but also building learners' capacity to monitor and evaluating their own learning.

Principle 3: Providing collaborative learning opportunities

- It highlights the need to include activities that have collaborative nature to facilitate learners' learning.

Principle 4: Anchoring the curriculum on big ideas

- It highlights the importance of identifying the core ideas in a curriculum and being able to teach in an in-depth manner.



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What is new in the course?

- ☐ Using the learning principles as the over-arching guide for designing the curriculum, pedagogy and assessment of a course.
- ☐ The learning principles are part of the content of the course.

What is new?

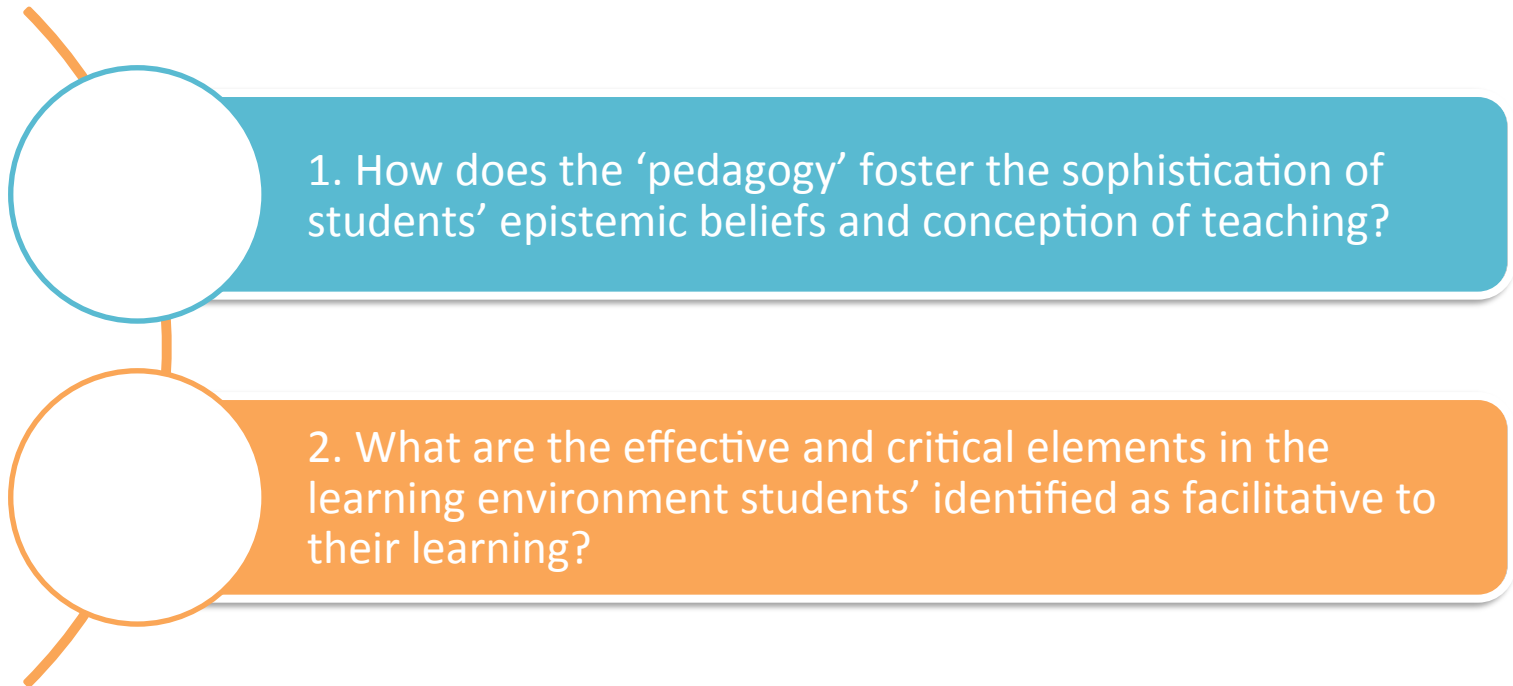
- ☐ In other words, students experience the principles first-hand, as well as knowledge to be learnt.
- ☐ Content and process are aligned.



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Research Questions



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Context

Course title:

- TLS3017 Teacher as Curriculum Planner

Period:

- Semester 1 2016-2017

Durations of lessons:

- 3-hours lessons
- 11 face-to-face sessions

Participants:

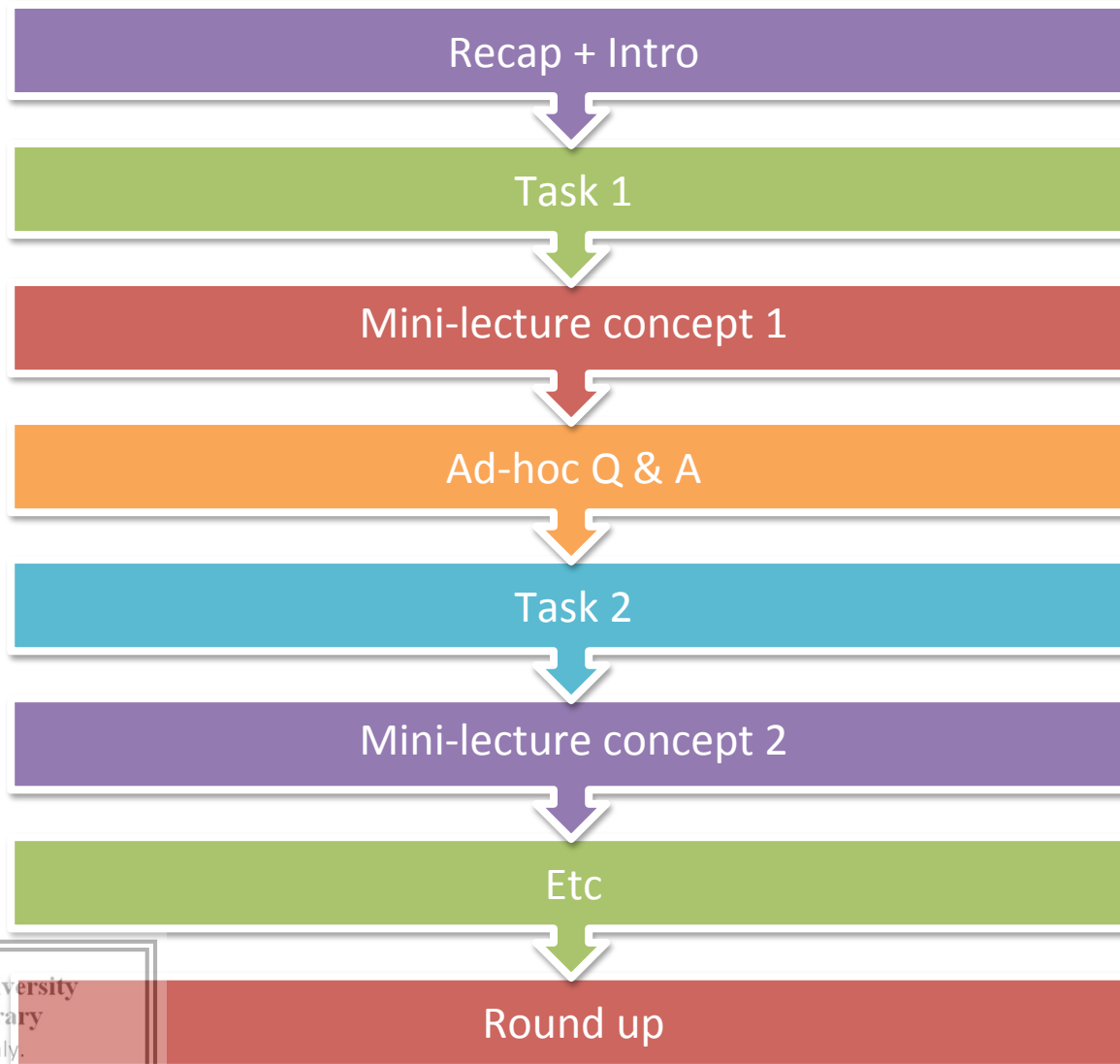
- 22 students



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Characterizing the lesson routine



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Examples of tasks used

Tasks ranged:

- ☐ From small-scale, unstructured discussion on single question/concept
- ☐ To full-blown jigsaw type of structured group discussions which takes up almost two hours



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Principle 1: Activating prior knowledge

In the lesson on ‘prior knowledge’, students were asked to think of contexts they had come across the term and its meaning (mostly about writing lesson plan)

e.g. p.8, p.13



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Principle 2: Developing metacognitive abilities

A workshop was given to students to help them understand the standards and criteria of the final assignment.

Students were provided with the grading rubrics, alongside previous students' work (anonymized). They were asked to grade the work with justification by using the rubrics individually.

Then students had to discuss in group to arrive at consensus of grade.

Each group shared their agreed grade in class.

Teacher shared her grade and observation to bridge between discrepancies

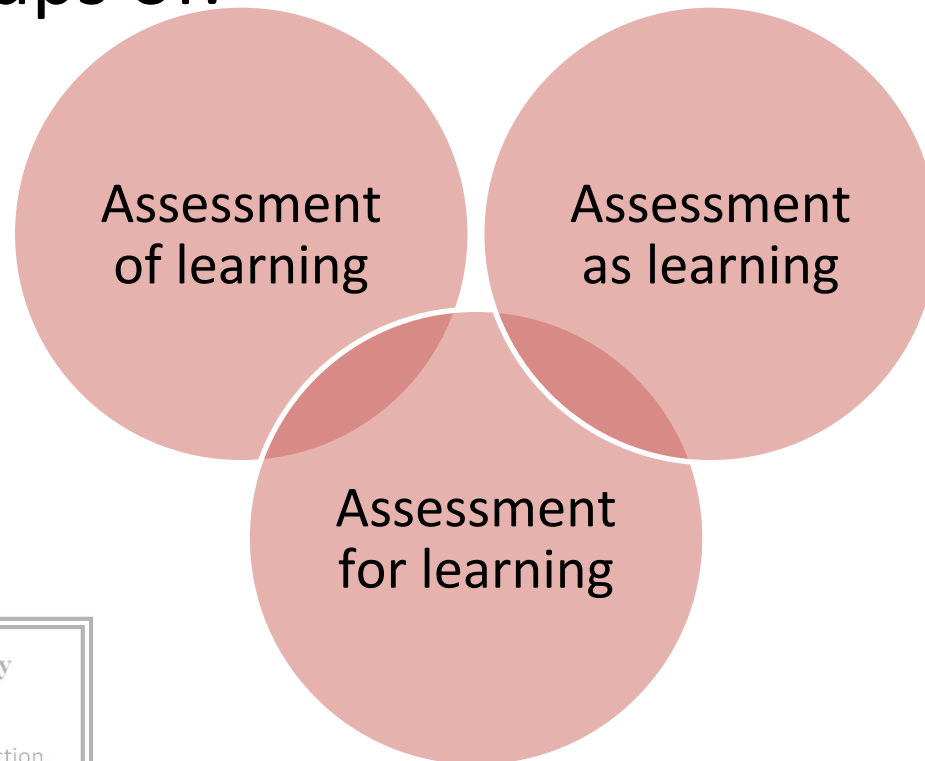


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Principle 3: Providing collaborative learning opportunities

- ❑ Jigsaw on topic of assessment (p.37-44).
- ❑ Students were assigned into expert groups of:



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Principle 4: Anchoring the curriculum on big ideas.

Core principles in guiding curriculum planning will be used as the major axis of the course (Theoretical underpinning of curriculum; constructivism in teaching and assessing and constructive alignment).

1. Constructivism: Four learning principles
2. Identification of learning goals and objectives
3. Curriculum model
4. Role of assessment in curriculum



RESULTS



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Instruments

- *Epistemic belief Questionnaire (Lee & Chan, 2015):*
 1. Source (3 items; 'Everyone has to believe what the experts say');
 2. Certainty (4 items; 'All questions have one right answer');
 3. Development (4 items; 'There are some questions that even experts cannot answer');
 4. Justification (3 items; 'There is no need to find more evidence to support well-known theories').
- *Conception of teaching (Chan & Elliott, 2004):*
 1. Constructivist conception (12 items; 'Every learner is unique or special and deserves an education tailored to his or her particular needs');
 2. Traditional conception (10 items; 'Good students keep quiet and follow teachers' instruction in class'.)
- *Constructivist learning environment survey (CLES; Taylor, Fraser & Fisher, 1997):*
 1. Learning about the world (4 items; 'New learning relates to experiences or questions about the world inside and outside of school');
 2. Learning about science (4 items; 'Students learn that scholarly knowledge cannot always provide answers to problem');
 3. Learning to speak out (4 items; 'Students feel safe questioning what or how they are being taught');
 4. Learning to learn (4 items; 'Students can help teacher decide which activities work best for them');
 5. Learning to communicate (4 items; 'Students are asked to explain their ideas to another students');

Intervention effect

Repeated measures MANOVA:

- Epistemic beliefs:
 - Wilks $\lambda = 0.87$, $F(4, 45) = 1.67$, $p = 0.17$, $\eta^2 = 0.13$
 - Development $F(1, 48) = 5.28$, $p = 0.03$, $\eta^2 = 0.10$
- Conception of teaching:
 - Wilks $\lambda = 0.79$, $F(2, 46) = 6.04$, $p = 0.005$, $\eta^2 = 0.21$
 - Constructivist conception $F(1, 47) = 8.74$, $p = 0.05$, $\eta^2 = 0.16$)




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Interviews

Invitation emails were sent to 12 students (6 high, 4 mid, 2 low) upon grade release of the semester for in-depth interview.



8 students responded (6 high and 2 middle).



I conducted the in-depth interview.



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Interview protocol

- ☐ Semi-structured interviews were conducted.
- ☐ Participants were first invited to discuss any memorable aspects of the course.
- ☐ The interviewer then prompted them to explain how and why these incidences related to and facilitated their learning.
- ☐ This process was repeated until the participants could no longer recollect anything further from the course.
- ☐ The interview took on average 25 minutes.



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Qualitative results

Two strands emerged:

- The role of collaborative learning (discussion) in their learning of this course
- The concept of prior knowledge (need further data collection and analysis)



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Make a quick guess: Yes or No

Students in general don't like discussion. They think all discussions are waste of time. They just want to be left alone.

Students prefer to choose their group members in discussion rather than being assigned to work with unfamiliar peers.



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Three themes emerged

1. What's worth discussing?
2. When does the discussion take place?
3. How's the discussion structured?



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1) What's worth discussing?

Preference of discussion

- Students are reflective about their learning preference and can offer explanation on engagement and non-engagement in discussion tasks in different learning situations

'It's just that I don't think all discussions are worth doing. For those discussions that are not worth doing, I would rather not to speak.' (Participant. 3)

'If I find a discussion or question worth my effort, I would like to raise my thoughts and answers to see what advice or idea my teacher would offer to me, otherwise...' (Participant. 2)



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2) When does the discussion take place? Sequencing discussion

- ❑ Whether discussion is worth pursuing or not, students do not judge it from the content's ontological importance.
- ❑ Instead, what they mean by 'worthiness' is actually '**efficacy**' -- that is, whether they can have the competence and sufficient background knowledge to complete the discussion.



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‘Many lecturers would keep on presenting their points during the lessons and they would invite the floor to discuss a few questions **just before the lesson ended**. However, I might not understand the lecture and therefore the questions, so....’ (P2)

‘I remember that the flow of this course is different...in most lectures in this course, we were asked to do discussion **at the very beginning of a lesson**. Then we shared our ideas with each other before your explanation of a new topic. In other courses, we **mostly listened to a lecture before entering into a discussion**. Sometimes you wouldn’t want to listen to the lecture and then you were asked to take part in the follow up discussions which would hardly arouse your interest. But in this course, we were asked to discuss on some new knowledge which **we didn’t know much at all**. There is a lot of room for us to express our ideas. After discussions, we would want to listen to the elaboration and get to know the answer. This is very special.’ (P3)



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‘I would have a chance to think by myself before you really get into the topics. My mind would get more ready for what would be going on in the lesson. You would ask us to think over the concepts in group **before** you elaborate the topics...When you asked us to think by ourselves, I felt what I’ve known was not enough and I needed to consolidate what was on my mind before listening to your lecture.’ (P5)

‘Many of the discussions in this course allowed us **to think from zero.**’ (P3)



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3) How's the discussion structured? Group assignment

It may appear counter-intuitive. Participants unequivocally expressed that they found an imposed group structure very facilitative to their learning

- Social pressure motivates them to participate
- Group diversity broadens their horizon and reinforces the meaning of discussion
- Mixed group deepens the impression of discussed content



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‘This is the first time I need to be involved mandatorily in group discussion, where I was made to meet and discuss with different classmates for different discussion tasks. This is my very first time since I began my study in University. I think this is **an effective way to force us to speak up and express our opinions.** This impresses me most.’ (P3)

‘Splitting the class into groups for activities also led us **to feel more involved and engaged.** [Imposed] grouping did help. Students in each group usually didn’t know each other. You then have **to force yourself to speak up** in a group of strangers and wouldn’t let dead silence happen’ (P1)



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'You would often rotate or change group members for discussion. This allows me to share views with different people in the class and that **has widened my horizons**. As a student attending a class, he or she should be responsive to the teacher's teaching. If the teacher asks you to do the discussion, and when everyone is moving forward to do that, you won't choose to do nothing there. (P2)

In this course, students were from various faculties so we would take the discussions more seriously. Your way of grouping helped mix students unexpectedly and every time the members in groups vary. (P5)



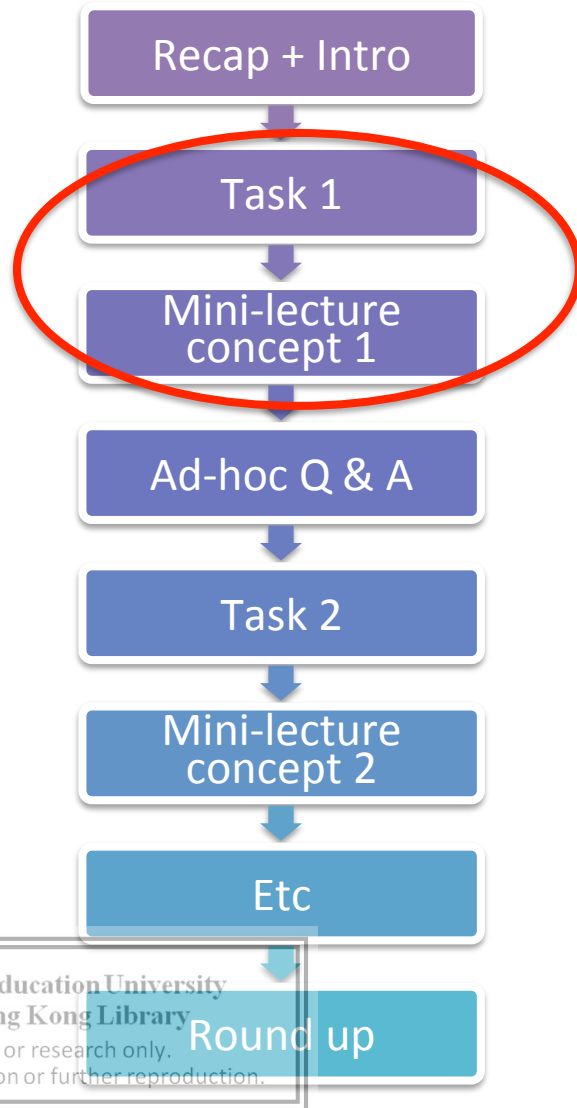
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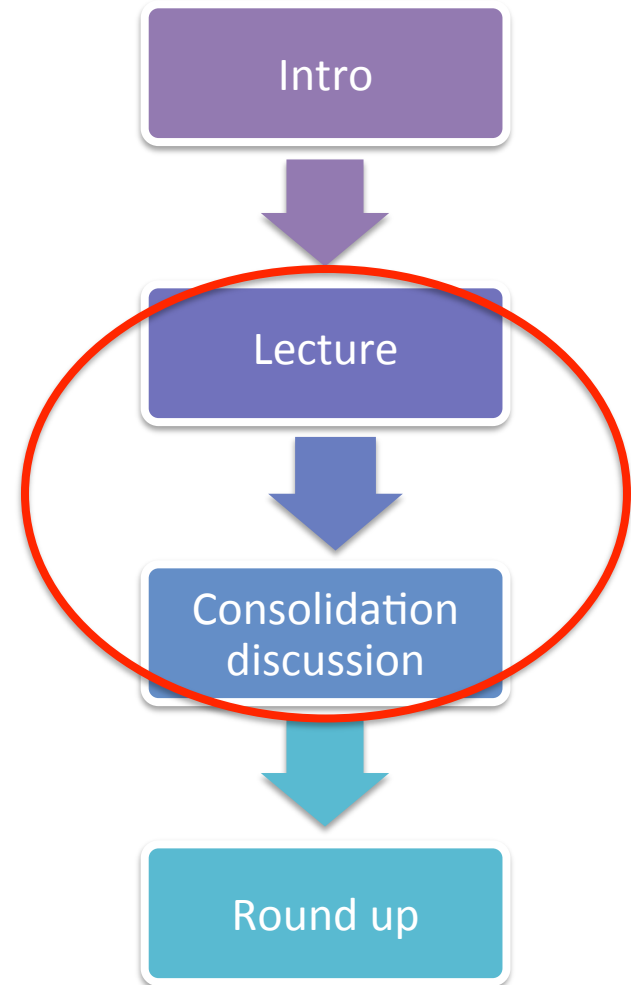


Juxtaposition

Students' experience in TLS3017



Students' prior experience of discussion



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Round up

Takeaway from interviews

Consider using tasks to unearth students' prior knowledge, instead of only for consolidating understanding. Therefore, use task before teaching a concept instead of after.

- (give variation on the use of task)

Consider providing structure to group for optimal interaction and exposure.

- (give variation on group structure, but this comes later only when the first two points have been well taken care of)

Consider student's efficacy sensitively

- (remain attuned to their prior knowledge in relation to the concept to be taught)

Overall reflection

- (Sense of hope) Students were not passive intrinsically. They become active when learning environment is appropriated.
 - Concrete and doable reminders on designing discussion and activities in lesson to promote engagement
- Among the four principles, collaborative learning (as process) and prior knowledge (as content) are the most memorable.
 - But why?
- Understanding the discrepant indications between quantitative evidences (decline and regressing) and qualitative evidences + also first-hand observation in lesson (receptive and progressing).
 - May be abstract conception progresses by regressing first
 - Need multiple time point measurements to test curvilinear relationship



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