Designs for peer interaction

Steve Draper,   Glasgow University

For the slides, references, access to the students' work, etc. see:

http://www.psy.gla.ac.uk/~steve/talks/uhi.html

UHI Inverness   10 March 2011

1

Outline of this workshop

1. Now: Admin: Sort out the groups you will be working in later

2. Talk by me:
   A. The 3 roles of teaching
   B. How to focus feedback strategically
   C. Some recipes (learning designs) for peer work

3. Groupwork by you:
   A. Go to the learning (self-teaching) group areas
   B. Back to home groups for reciprocal-teaching

4. Wrap-up by me.

5. (More) Questions and discussion by you.

2

(Admin.)   Before you get settled:

Later, you'll be doing stuff in groups. Each person will belong to 2 groups.

A. Home groups:
   • Divide into groups of 4 **NOW** even if you have to move your seat. Sit with them now, for my main talk.
   • 3 is no good (you'll miss stuff)
   • 5 is second best (but a few will have to do this)

B. Pre-Assignment to colour groups: (do this **NOW** too)
   • Among the 4 of you in your home group, assign each person one of these colours (Pink, Green, Blue, Yellow).
   • (If 5 in a group, then two people will take the same colour.)
   • **Remember your colour.**   Write it down.
     It is no-one else's job to remember it.
   • Remember the other people in your home group, so you can find them again later after being away.

3

Who am I?

Where am I / this workshop coming from?

I work in the psychology dept. of Glasgow University.
My research area is Learning and Teaching (L&T) in HE.
I've done work on EVS (voting handsets); PAL (peer assisted learning); Feedback (with David Nicol); retention; podcasting; …

You can see much of this on my web pages:
http://www.psy.gla.ac.uk/~steve/

4

Part A:

The 3 roles of a teacher and where the big improvements are

•Delivering: presenting, or facilitating discussion

•Selecting what is to be taught and how it should be expressed

•Selecting (or designing) learning activities

5

The general effect of teachers

According to Dylan Wiliam (for English schools):
The biggest causal factor in most studies, is which teacher a child gets: differences (in learning outcomes) are almost always more affected by which teacher than by whether you get the "new" or old teaching method in an experiment.

It will make more difference to a child whether they get the best or worst teacher in a given school, than whether they go to the richest or most "deprived" school in a region.

And recent papers on USA school data emphasise this still more; and report that neither the level of qualification (postgrad degree?), nor the quality of the university it was from, nor the number of years of experience after the first, make a clear difference either.

6

So …

So Teachers make the biggest difference to learner outcomes — but how?

It isn't transmitted teacher to teacher, so it must be a tacit skill.

What clues from the literature are there on what it is a teacher can do that really makes a big difference?

I've started grouping the literature under 3 types of thing an HE teacher does ….

7

3 roles of teaching

(Academic jobs are typically expressed as having 3 kinds of work: Research, teaching, administration.)

So teaching matters,
  But in fact, teaching has 3 facets.
And a person might be excellent at one, yet rubbish at another.
I.e. good teaching is not a single thing

• Delivery e.g. lecturing, facilitating discussions.
• Knowledge selection and expression.
        Selection of topics; selection or authoring of materials
• Designing learning activities.

8

Role 1 of teaching: Delivery.
The "Dr.Fox" experiments

There have been experiments on whether lecture delivery skill made a difference to learning.
Hired an actor; fixed the script; had it delivered with high or low "expressiveness".
But also, tried it on 2 groups: students who expected to be tested, and students who did not.

If they thought they had to learn it, it made a difference to their ratings of the lecture but not to their learning (test scores);
If they thought they didn't have to learn it, then the well delivered lecture caused higher learning.

So in HE, student will power overrides teacher delivery lack of skill. Good delivery is good professional practice, but it isn't a bottleneck to learning.

9

Role 2 of teaching: knowledge selection and expression   —   Chick sexing

To be learned: sexing day old chicks (for the egg industry)
Viewed as an implicit skill: some people could do it, but couldn't tell you how to do it yourself.
Training used to take 6-12 weeks to get a person up to speed and accuracy for useful employment. Method was loads of practice, feedback from an expert.
Then researchers worked on creating an instruction leaflet (pictures, some text). Trainees learned more in 1 minute from the leaflet than in previous 6-12 weeks.
This is an improvement of about 26,000 times.

So discovering the knowledge, and expressing it in a leaflet can be very valuable: one role of a "teacher".

10

Role 3 of teaching:
Learning activity design

Two related cases of very big gains through a learning activity design.

• Hake's "Interactive engagement"

• Mazur's "Peer instruction"
  (really, peer discussion of brain teasers)

11

Hake

Hake (1991): "The results [course feedback] showed quite clearly that my brilliant lectures and exciting demonstrations on Newtonian mechanics had passed through the students' minds leaving no measurable trace. To make matters worse, in a student evaluation given shortly after the exam, some students rated me as among the worst instructors they had ever experienced at our university. Knowing something of the teaching effectiveness of my colleagues, I was severely shaken."

So he went looking for better ways to teach physics …..   12

Hake's survey

What he found was widespread use of a method he calls "Interactive Engagement" (IE)

Hake (1998) published a survey of 62 courses (6,542 students) all studying the same subject, all using the same standardised test, and using it both pre- and post-.

He graphed the mean gain on each course against whether or not it had used the method of "Interactive engagement".

13

See fig. 1 in:

Hake,R.R. (1998) Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses Am.J.Physics 66(1), 64-74

Hake's results

14

Mazur

Crouch & Mazur (2001) published an analysis of 10 years of Mazur's MIT course.

Again, the standardised pre- and post-test.

He concludes he has doubled the amount of learning, but the graph suggests that really, he tripled it.

15

See fig.2 in:

Crouch, C.H. and Mazur, E. (2001), "Peer Instruction: Ten years of experience and results" American Journal of Physics   69, 970-977

Mazur's gains

16

The Mazur / IE learning design

"Interactive engagement" and "peer instruction" revolve around asking students questions. These may be presented using Electronic Voting Systems (EVS).
And then getting them to discuss the questions with peers.

But what kind of questions?   Brain teasers.

17

Brain teaser questions

The point is to provoke debate, internal and between peers.
Cf. Socratic questioning, and "catalytic assessment"

Remember the old logo or advert for Levi's jeans that showed a pair of jeans being pulled apart by two teams of mules pulling in opposite directions. If one of the mule teams was sent away, and their leg of the jeans tied to a big tree instead, would the force (tension) in the jeans be:

- half
- the same
- or twice what it was with two mule teams?

18

The importance of learning designs

So more effective teaching can be achieved by particularly effective learning designs.

Much of the educational literature is concerned with learning designs as a way of improving learning. After the chick sexing case, Mazur / Hake are the biggest learning improvements reported in the literature.

They are based on employing peer interaction.

The rest of this workshop is concerned with learning designs which use peer interaction as a key feature.

19

Part B:
How to focus feedback strategically.
Core Disciplinary Criteria (CDC)

The argument here is: Focus the feedback more effectively, not on the any bit of work learners do, but on learners grasping the core criterion.

20

Anomalous NSS result in 2009

The GU psychology dept. got rank 5 of 107 UK psy. depts. overall. *(The rank used in newspaper league tables says 3rd; the difference/reasons do not matter for the argument here, which use a more conservative estimate.)*

But we got ranks much lower than this for 19 of the 21 questions. How can the administrative merits (qus. 14, 15) outweigh the assessment and feedback questions (5, 6, 7, 8, 9) by such a great amount?

This is impossible to explain if the NSS is measuring the importance of feedback.

21

Rank	Qu.	Qu.text
1	14	Any changes in the course or teaching have been communicated effectively.
2	15	The course is well organised and is running smoothly.
5	22	Overall, I am satisfied with the quality of the course.
8	6	Assessment arrangements and marking have been fair.
8	11	I have been able to contact staff when I needed to.
8	16	The library resources and services are good enough for my needs.
11	13	The timetable works efficiently as far as my activities are concerned.
16	1	Staff are good at explaining things.
35	5	The criteria used in marking have been clear in advance.
54	7	Feedback on my work has been prompt.
79	9	Feedback on my work has helped me clarify things I did not understand.
101	8	I have received detailed comments on my work.

How did my dept. get away with this?

Students get almost no feedback on content taught in the examined modules. (No uniform feedback policy.)
Identify the hardest thing they have to learn over the 4 years (CT)
Invest in small group (6 students) and individual tuition on this.
Have a major set of assessed exercises (CRs) just on this.

Critical thinking is also a marking criterion for the written exams on the content modules.
We get transfer on this from 4,000 word 3 month CRs to 60 min. exam essays. (So did another course, in History.)

[Personal tuition is like the hospital system. It makes doctors feel useful, and patients grateful. But it's expensive, and every time it's used is a case where the real health system (prevention) failed badly.]

23

Core disciplinary assessment criteria

We know from the feedback literature, especially Sadler 1989, that a key difficulty for students is understanding the meaning of assessment criteria. Classic ineffective feedback is "poor conclusion" or "not critical enough" because exactly what the student doesn't understand is what is not expressed there: the meaning, and its operationalisation, of "good conclusion" or "critical argument".

Not all criteria are difficult.
But the criteria that are difficult, are not just poorly communicated. They typically are the ones that lie at the heart of a discipline's tacit definition of itself. In other words, they are the most important thing a student must learn during their degree; and often, staff cannot easily explain them: they may be held as tacit knowledge.

24

Core disciplinary assessment criteria (2)

There is a real sense that the central learning aim of a history degree is to learn to write a history essay.

In psychology, to write a psychology essay.

In physics, to demonstrate analysis, reasoning and calculation like a physicist (not like an accountant, or mathematician, or logician)

25

Core disciplinary assessment criteria (3)

So on this account, the key question for each discipline is:
What is the assessment criterion that is closest to meaning:
   "Display thinking like a scholar in this discipline"?

Many disciplines in HE already have much of their assessment organised around a single standard format that exhibits this thinking style e.g. essays for most Arts and Social Science subjects (but actually, quite different essay types depending on the discipline), "problem solving" involving calculation i.e. inferential maths in most science and engineering.

The argument here is: Focus the feedback more effectively, not on the assessment format (i.e. not simply do lots of essays or whatever) but on learners grasping the core criterion.

26

Recommended Strategy? —
Focus on your CDC

• Identify your core disciplinary (assessment) criteria (CDC)
• Focus most or all effort on training students on it:
      both student effort and staff effort
• Usually many assessments already do test them
• However the same focus may not be present in the feedback
• Furthermore supplementary exercises may be effective.

27

Why?

• The CDC are the procedural version of threshold concepts.
• They are the hardest things students have to learn
• They are the most important too: almost all assessment in fact uses them.
• They require a longer timescale to master (not one short module)

• <u>The reward is to see this learning transfer across modules; even across years and departments.</u>

28

Part C:
Some recipes / learning designs
for peer work

RPC

Micro Critical Thinking exercise

Jigsaw related

29

Recipe 1: Reciprocal Peer Critiquing

<u>Reciprocal Peer Critiquing (RPC)</u>
Psychology level 3 undergraduates; tutorial group of 5-6; one semester.

Done twice in the semester, first with past (already marked) work; second for new coursework before submission.

• Students bring in and exchange work
• Prefaced by 1-3 questions they particularly want comments on
• Each student critiques 2 others, addresses criteria plus the questions; rubric: "best and worst feature" w.r.t. each criterion
• Next time: Round table, feedback delivered F2F, tutor chairing

30

Prompt sheet

Criterion 1: quality of literature research
 What was good?
 What could be improved?

Criterion 2: quality of the write-up
    i.e. well presented and clearly structured?
 What was good?
 What could be improved?

Criterion 3: quality of Critical analysis
 What was good?
 What could be improved?

Why is RPC good?

• Many students may not really be applying the criterion at all, even as a writer. RPC forces them to apply it as a distinct task.

• It exercises the <u>same</u> criterion as a reader/critic, in addition to as a writer.

• Peers: you argue with yourself about whether to accept their criticisms.

• You see alternative solutions (other students' work): it widens your ideas as a writer.

32

Big scale RPC

What about big classes?
 As described, it works for groups of 2-6.

1. I've done it in a lecture group of 90 for short (100-200 word) passages: swap with neighbour and do RPC

2. Use software to manage it.
 There is free software, and numerous papers reporting experience, on how to do it with big classes (60, 600, ..)
 Quintin Cutts has some local experience;
 John Hamer: google "Aropa peer"

3. Speed RPC-ing? (like speed dating)

33

Recipe 2:
A micro Critical Thinking exercise

I've also successfully used a further CT exercise in workshops:
In "revision sessions" for our students
In workshops with History students
In a Dundee workshop for students in a variety of essay-based disciplines.

The micro-CT portion takes perhaps 30 mins of a session.
Here it is as instructions to students.
I usually have participants do it twice over (on 2 topics). 34

The exercise

In a minute, I'll announce a topic.

From that moment you have 5 minutes to write something on that topic. Most people write a medium length paragraph: about 14 lines of handwriting (depending on how big or small your writing is).

It will then be marked for the format of critical thinking:

1. Mentioning alternative possible views
2. Giving reasons or evidence for the views mentioned.
3. Mentioning reasons <u>against</u> your preferred view.
4. Clear support for **one view in preference to** the others on the topic. (Not sitting on the fence) **35**

Why a micro exercise?

If you want to understand an underlying principle, whether conceptually or operationally, then it is good to vary (perhaps drastically) the examples and time scales on which to apply it, rather than always practising it in one narrow way.

That is why I believe this complements our 3 month critical reviews; and our 60 minute unseen exam essays.

36

Recipe 3: Aronson's Jigsaw classroom

Aronson and his graduate students developed the Jigsaw Classroom learning design, originally for a special purpose: tackling the problems when US schools were forcibly desegregated. How to get the different groups of kids to work together, and stop destructive competition.

Basic answer: Make them depend on each other. Their only access to the knowledge on which their marks depend, is from other kids teaching them. Split the class into groups, each specialising on one part of the curriculum; prepare materials; present.

But this has other good effects. One of the biggest is that the work they produce is of real value to others: whereas normally all student work is artificial, with no end user. 37

Aronson's actual design (2)

The students in a history class, for example, are divided into small groups of five or six students each. Suppose their task is to learn about World War II. In one "jigsaw group", Sara is responsible for researching Hitler's rise to power in pre-war Germany. Another member of the group, Steven, is assigned to cover concentration camps; Pedro is assigned Britain's role in the war; Melody is to research the contribution of the Soviet Union; Tyrone will handle Japan's entry into the war; Clara will read about the development of the atom bomb. Students are then tested on what they have learned about World War II from their fellow group members.

To increase the chances that each report will be accurate, the students doing the research do not immediately take it back to their jigsaw group. Instead, they meet first in "expert groups" with students who have the identical assignment (one from each jigsaw group).

Dimensions of Aronson's version

• *Each person is a member of not 1 but 2 groups

• Total number of learners ≈ 20-30

• Group sizes are both ≈ 5

    (self-teach, and reciprocal-teach)

• No ICT / VLE used.

• Done every 1-2 class meetings; repeated over the term

• School (not HE) level

39

Jigsaw exercise

We're now going to try doing a variant of the Jigsaw design as part of this workshop.

Phase 1: [You move to another place]
    Expert groups = Colour = Self-teaching

Phase 2: [You return to where you are now]
    Jigsaw groups = Home groups = Reciprocal teaching
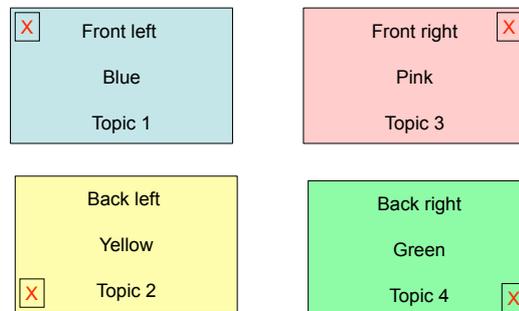
40

A place for my monologue to stop…

… and for you to go into phase 1 of groupwork

Now go to the corner of the room corresponding you the colour you were assigned in your "home" group.

41

Learning (self-teaching) groups

Front of room, screens, podium, presenter, ….

X	Front left Blue Topic 1		Front right Pink Topic 3	X
	Back left Yellow Topic 2 X		Back right Green Topic 4	X

<u>Move to your learning group areas</u>

Groupwork Phase 1:
Self-teaching (expert groups)

- Now go to the quadrant of the room corresponding to the colour you were assigned within your "home" group.
- If there is a second person from your home group in your colour group, do NOT sit with them during this phase.

- Pick up the (coloured) handout for your learning group.
- Study the handouts with a view to preparing a few minutes of explanation for your home group.
- There is both a short passage and some study questions

- After getting a preliminary grasp, discuss this with a few others (e.g. 2 or 3) in your learning group.

43

<u>Back to home groups</u>

Groupwork Phase 2:
Reciprocal teaching
(jigsaw / home groups)

- Return now to your home groups.

- In turn, teach the other 3 people in your group what you learned.

- Learn from them what their topics were.

44

Review dimensions the cases

- Is each person a member of not 1 but 2 groups?

- Total number of learners? 20-550

- Group size for self-teach phase? (1 – 6 - …)

- Group size for reciprocal-teach phase? (1 – 6 - …)

- Is technology / a VLE used?

- Done every 1-2 class meetings; repeated over the term

- School / HE? Level? Subject?

45

Technology?

Jigsaws can be, have been, done in:

- (F2F) school classrooms

- Online e.g. in a VLE like Blackboard

- Some mixture …

Also:

- One-off ad hoc like today

- Vs. in class, for credit, taking into account those absent on the day.

46

Some more dimensions of Jigsaw designs

Obviously there are many variations on the Jigsaw idea to fit local contexts. Some dimensions of these are:

- Class/group sizes (often different for Jigsaw vs. Expert groups)
- Frequency and duration of the cycles: once a week … a year…
- Duration and number of cycles done (one-off; weekly all year)
- *Focus on getting new knowledge, or on integrating elements
- *Solo or group process for each bit (e.g. seminars do solo for self-teach, but group for reciprocal-teaching)
- Audience motivation (examined on it; have to do a critique; none)
- F2F, remote-print, remote-digital link; …
- Personal, anonymous, ….
- *Dialogue when delivered: none, with teachers, with peers, …

47

Jigsaw-related learning designs

Before the groupwork, you heard about the original Aronson Jigsaw design.

In the groups, you heard about 4 other varying cases related to Jigsaw.

A cousin of these is the "Patchwork Text" design.

And a cousin of that is the "Socratic Dialogue" or "Constructive Interaction" activity.

48

"Patchwork Text" learning design

- (A cousin of Jigsaw)
- Every week (say), each students writes a short piece.
- AND keep a private reflective diary
- The topic is typically personal: e.g. incidents, feelings, meanings from their own professional practice. Thus each student has the same brief, but quite different material.
- Every week the format, genre is different e.g. short story, newspaper article, …. Or lit.review, data report, data analysis ..

- They discuss their piece with members of a small group: same group each week. RPC feedback.
- Overall aim is to produce a big piece / portfolio by end of term
- At half term, re-read one's own patches and diary: look for "emergent" themes, to use as a structure for final portfolio.

49

Patchwork Text (2)

Similarities to Jigsaw:
- Small peer groups
- Regular writing
- Eventual integration of parts into a larger whole

Contrasts to Jigsaw:
- Accretion and merging are implicit in Jigsaw, but the focus in PT
- Focusses on the personal, not the public / objective
- Focus on induction / creativity: scaffolding for coming up with an original argument.
- Writing in multiple genres
- The peer groups give feedback and understanding (RPC), but do not collaborate on a joint product.

50

"Socratic dialogue" (1)

A particular take on what Plato's Socrates did, also known in some literature (Miyake, 1986) as "constructive interaction".

Take / agree a topic or problem.
Attempt to evolve a theory (more detailed explanation)
Raw material is existing experiences the participants already have.

E.g. "How does a sewing machine work?"
    ("What is learning?")

The aim, or orientation, is to create a theory or explanation that all agree with.
But in fact there is no requirement for an actual joint output product; and experiments show this is not the usual outcome.
51

"Socratic dialogue" (2)

It is really the essence of academic conversation (but do we ever actually make sure students gain experience of this?)

It is doing reflection: working towards consistency among things we know; between instances and generalisations we are inclined to. Doing induction from cases we know to some more general statement.

52

Socratic dialogue (3)

Similarities to Patchwork Text:
- Small peer groups
- Linking private experience to general ideas.
- Focus on integration of (argument) parts into a larger whole
- Focus on induction of new ideas from a vacuum.

Similarities to Jigsaw:
- Assumes a positivist, consensus attitude to truth

Contrasts to both:
- No repeated (weekly) activity
- Reading and writing are not the focus

53

Part D:
Wrap-ups

54

9

Extra dimensions

Comparing Jigsaw, Patchwork Text, and Socratic Dialogue:

A. Does a design focus on new knowledge in small chunks (jigsaw)
   OR on merging / integrating / assimilating chunks (PT, SD)

B. Dialogue.
   Is there dialogue around each of the phases
        (self-teaching and reciprocal-teaching)?
   The options are:
        1. Solo, small group, plenary audience
        2. No dialogue, with peers, with a tutor, with both.

55

Family Relationships

Jigsaw can be seen as part of several different family networks of
    designs.

- Jigsaw — Patchwork Text — Socratic Dialogue

- Student generated content: Text, Critiques, Test questions, …

- Major peer interaction recipes: SGC, PAL, Peer mentoring,
  Reciprocal teaching, Constructive interaction, …

- Employing Jigsaw for special exercises OR in the main
  classes?

56

Tactics for a focus on CDC

- Exercise the/each criterion in both directions: not just as
  authors but as readers/critics

- Exercise the same criterion in tasks that are superficially
  very different (learn what is common across contexts)

- Try radically different timescales.
  3 month, 1 hour, 5 minute versions.

- (Using peers can make more of this affordable.)

57

Lists of benefits of the peer techniques

If RPC (reciprocal peer critiquing) is part of the design:
Peers make you think about whether to accept their view or not
Peer's voice often better (closer) to learner's idiolect
You see plenty of peers' work: enlarges your techniques

Given RPC or a huge tutoring staff then:
Plenty of work done early, done regularly, done early in course
Plenty of feedback on the work
Learn procedures (e.g. critiquing) faster by more practice
Learn them better by experiencing the integration of parts into
    larger wholes (in some Jigsaw related designs)

Group bonding effects, given a shared/common task.

Teaching others promotes our own learning; and you gain   58
    confidence from having your work valued, meaningful.

Other reasons / methods for having peer interaction as a big part of L&T

The dramatic reductions in dropout (25% dropout —> 5 %)
    achieved by some Australian schemes using either peer
    mentoring, or peer assisted learning.

Learning by teaching is probably the single most powerful learning
    technique for an individual. Even better if the other is actually
    learning from it.

Self-efficacy: helping peers gives people confidence in their own
    worth.

Authentic academic work: seeing your essay used and valued by
    other students.

59

A place to stop

For the slides, handout etc. see:

http://www.psy.gla.ac.uk/~steve/talks/uhi.html

60