Some less obvious factors underlying HE learning today

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http://bit.do/TTiZ

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

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Part 1:

Setting the scene

The whole of this talk is about interaction.

And most of learning too is about interaction.

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This talk in numbers about interaction

3 **classes of entity** to interact with

5 grades of **quality of mental interaction**

5 **requirements for peer interaction**

3 **perspectives** needed to analyse each learning activity

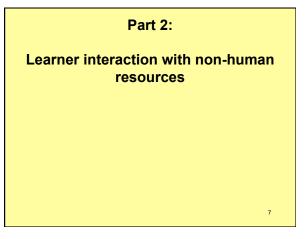N? types of **conversation** needed

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Learner interactions (0)

Almost all learning can be seen as interaction.
   But with whom or what?

I'm not going to waste time on remedial education for the
   kindergarten by pointing out that in education, unlike
   computing, "interaction" doesn't refer to what a student's
   fingers are doing, but with what is a student's mind interacting,
   and at what level.

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Learner interactions (1): Entity classes

There are 3 kinds of resource or entity with which a learner may,
   and needs to, interact:

1. (Non-human) objects e.g. eBooks

2. Teachers

3. Peers (other learners)

   ....

4. *Plus: Self   (I will not deal with reflection in this talk)*

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Learner interactions (2): Grades of quality (for learning).

Chi (2009) proposes a scale of increasing learning effectiveness,
of kinds of interaction or "engagement":

   a) *Inattentive*

   b) **Passive** e.g. listening

   c) **Active** e.g. answering a closed question (i.e. with right and
      wrong answers)

   d) **Constructive** e.g. generating reasons or "self-
      explanations"

   e) **Interactive** (with peers).
      [N.B. constructivism (d) is only second best for learning.]

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Part 2:

Learner interaction with non-human resources

Forward to the past:
(interacting with class 1 entities)

One future might see us learning from textbooks with built-in exercises and answers in the back.

Chi has shown (or reminded) us that learners gain little from books, videos, 3D simulations [passive (b)] UNLESS they have a worksheet [active (c)], and still better, a peer to work with while going through the worksheet [Chi's "interactive" (e)].

Students feel they are learning, but tests show otherwise.

Objection

You will be thinking of the cases where you taught yourself without a worksheet. These cases are widespread, as Allen Tough has shown. They are also the cases where you are pre-motivated to learn a specific thing, are not under pressure; and above all, you do not much need a teacher.

In these cases there is no need for any teacher except textbook writers, and to some extent not even them.
There is no need for educational institutions. And no need for courses.
It is a world in which Wikipedia is already a complete substitute for universities.

But also, where learners will learn far fewer things: only what some other experience or person has convinced them they want to learn. These learners have already learned the questions, and only need the answers.

Lesson 1

Textbooks without exercises afford only quality level (b): passive. Just as would flight simulators without the human instructor and the mandatory set of exercises.

Wikipedia is only a level (b) resource. Textbooks with exercises afford level (c): active.

See also: Roediger, Karpicke on the relative efficacy of student revision activities. (Re-reading: no gain; self-testing: learning gains.) I.e. learners' own ideas and feelings about how to learn are wrong.

Part 3:

Peer interaction
(i.e. with class 3 entities)

-- and its requirements

Massive courses

In a MOOC class of 2,000 with "only" 10 GTAs, a learner can speak to a teacher for only 20 seconds per hour.
➔ Interaction with teachers is negligible.

There is then no point in having a course: this is the same as learning from a textbook without any human interaction, which does however have the big advantage of a) flexible learning in time and space; b) being self-paced learning.

UNLESS there is copious and productive peer interaction.

Requirements for productive peer interaction

1. Need to minimise the number in the group: 3 may be best. At least half the learning is from speaking: the larger the group, the less each learner can speak and so the less each learner learns. A forum of 2,000 is not peer-interactive. A group of 6 is twice as bad as one of 3.

2. Need to allocate learners to groups very fast; and possibly, as in speed dating, at the moment each one is ready to engage in such conversations. *[This is a missing software function.]*

3. Need to get them agreed on (to accept) a topic useful for learning (not wait, as in a Quaker meeting, until one feels moved by the spirit to speak).

4. Need to get the right productive tone of conversation: no politeness, no malice, give reasons, what B says should be contingent on what A just said.
   [Vygotsky, Plato: all knowledge begins in conversation.
   Science is a conversation style where conclusions are based on reasons; and reasons are grounded in empirical observations not authority.]

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The fifth element: synchronisation

But all that fails to mention the most important precondition for peer interaction which is productive of learning:—

5. It requires peers who are all at the same stage of learning, and therefore can, and want, to talk about the same stuff.

In other words, one of the big advantages of running a course, is that the whole cohort of learners is synchronous, in step with each other.

(This is just as true for "water cooler" conversations: about what was on TV last night, in the newspapers this morning, in the cinemas last weekend: how media by providing this sync, make conversation possible.)

I know of one online course which allows students to join at any time. It is disastrous: no peer interaction is possible, spontaneous.

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Must all courses be cohort-designs?

There is an old programme-design which is the opposite of cohorts: the dojo design. (Used in martial arts, but equally in scuba diving; medical ward rounds, ...)

Here, while the (say weekly) class meeting is synchronous, students of all levels of expertise at today's topic turn up, and the stage is set for quasi-peer instruction, exploiting the pyramid of expertise. Since teaching is the most powerful way of learning, this is good for all levels of student. (Synchronous by topic, but not by expertise level.)

This is a fundamental, though usually unconscious, design choice: to run the course in cohorts, or with a dojo design. One of the most fundamental dimensions of learning designs. (A hybrid is to allow students to join a course at the start of any module.)

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Part 3b:

Multiple, not one, types of peer interaction are needed

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Multiple peer interaction platforms

A friend recently experienced a MOOC which, she says, is the best educational experience she has ever had.

One feature I noticed in what she said, was that the students naturally (i.e. this wasn't anybody's design) used multiple platforms not provided by the course, in combination.

E.g. blogging sites for conversations all about one student's ideas; forums for equal discussions; twitter for brief and witty comments; Google Docs for big, considered, jointly revised documents; etc.

(I.e. I need peer interactions all about me me me; others about discussions without needing conclusions; others about creating a joint product; ....)

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Multiple peer interaction types (2)

My inference from this is that there is not one general type of peer interaction that is important for learning, but probably we need a variety even for a single group on a single topic.

Thinking that you have ticked the peer interaction box by saying you have some kind of groupwork somewhere in the course is utterly mistaken. (Like saying because your diet has vitamin K you don't need AS,B,C,E …)

First: Do you have any beneficial types of peer interaction? (and how many minutes does each learner spend doing it?)

But now in addition: Do you have ALL the beneficial types of conversation?

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Part 4:

Learner interaction with teachers (class 2 entities)

OR the social perspective

(OR The division between expository and interactive sessions)

A lesson from Video-linked lecture halls

Recently we were forced to use an overflow hall for a lecture session, linked by video.

The students allocated to it initially complained about second class treatment.

But by the end of semester, a large subset of them complained about having to go back into the main hall. Why?

1) The overflow wasn't full, so they could always sit by their friends, the same people each time.

2) There was a GTA in attendance AND the room wasn't in use before or after: consequently they could rely on being able to talk to a staff member: the resource of teacher interaction which was effectively not available in the main hall.

Video-linked lecture halls (2)

This reveals that, at least in terms of the student experience, you must analyse each learning activity in multiple ways, from multiple perspectives:

0. Physical: number of seats, visual angle to the displays, air conditioning etc.
1. Cognitive: the material to learn, and its representations; in relation to individual's mental processing.
2. Social: it is a social occasion. The linked hall without the physical presence of the presenter actually did better in affording social relationships and interaction, including teacher interaction.
3. Motivational: [no time to discuss this now.]

Parallel Perspectives

In a simple paper Svinicki (1991) suggests that there are 3 independent psychological / educational theories which independently can be used to improve teaching:
- Cognitive
- Social
- Motivational

The point is that, whether or not you like it, each activity, occasion has significant properties of different kinds; and the educationalist must address all these perspectives (theories, metaphors).

This is like electronics, where you must analyse a circuit electronically, and by physical layout (length of connections), and by heat dissipation. The perspectives have causal interactions, but are understood through independent theories.

Is one-way communication interactive?

If you see David Cameron on TV: is that interaction?

A purist like me wants to say No.

However Richard Mayer's design principle of "personalization" indicates, or rather reminds us, that there are strong social, inter-personal effects anyway. We respond to other people to a significant degree as if we had a personal, interactive relationship with them, even when it is in fact one-way.

Case 2: triangulation

We record and post slides and audio from lectures routinely.

I got a surprise recently. (Ab)using a tutorial to get some feedback, I was surprised that 5 out of 6 of the students (from a low-performing, low-motivated group) said they had already re-listened to some of the recordings half way through the course. One said that to understand me (!) they had to triangulate from the original live presentation, re-listening to the recording, and poring over the slides.

This is a use for technology that is new to me; and might even indicate a change in how "lectures" are used.

It also changes the boundary between live and recorded sessions; interactive and one-way; interacting with a teacher or with materials.

Triangulation (cont.)

Instead of thinking of lectures as monologue, it seems that (today at least) they have aspects of triangulation: where students get several different channels of information which they can compare to improve their grasp and certainty.
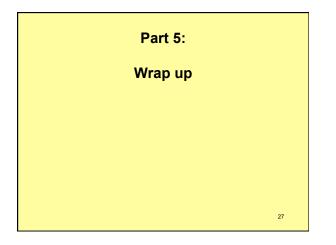
This may be a fruitful line of analysis: how multiple different channels combine on such occasions.

A growing binary divide

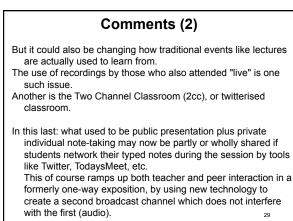The growing divide between expository lectures (as above)

Vs. interactive e.g. Mazur's PI; snowball discussions, etc., where recordings of the session may make little sense, and above all the learning is in the participation not the watching.

Part 5:

Wrap up

Comments

Technology mostly brings out general L&T issues, in apparently new forms OR which we should have recognised but didn't in the old contexts. It disrupts us, but is seldom new for the hidden laws of education: even if it forces us to improve our theory.

1. One such issue is that of "massiveness": since the MOOC bubble, we should review every learning design (e.g. Jigsaw) for how it could scale to any number of learners.
2. Similarly for online vs. F2F.
3. And for the different kinds of conversation that learners have and need: technology just tends to draw attention to them because of developers' tendency to write different software for each type.
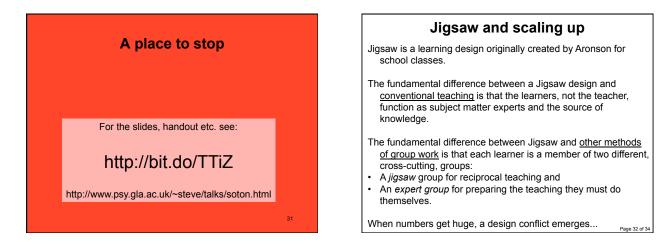
Comments (2)

But it could also be changing how traditional events like lectures are actually used to learn from.
The use of recordings by those who also attended "live" is one such issue.
Another is the Two Channel Classroom (2cc), or twitterised classroom.

In this last: what used to be public presentation plus private individual note-taking may now be partly or wholly shared if students network their typed notes during the session by tools like Twitter, TodaysMeet, etc.
This of course ramps up both teacher and peer interaction in a formerly one-way exposition, by using new technology to create a second broadcast channel which does not interfere with the first (audio).

This talk in numbers (recap)

3 classes of entity to interact with

5 grades of quality of mental interaction

5 requirements for peer interaction

3 perspectives needed to analyse each learning activity

N? types of conversation needed

2 broadcast channels in the classroom.

A place to stop

For the slides, handout etc. see:

http://bit.do/TTiZ

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

Jigsaw and scaling up

Jigsaw is a learning design originally created by Aronson for school classes.

The fundamental difference between a Jigsaw design and <u>conventional teaching</u> is that the learners, not the teacher, function as subject matter experts and the source of knowledge.

The fundamental difference between Jigsaw and <u>other methods of group work</u> is that each learner is a member of two different, cross-cutting, groups:
• A *jigsaw* group for reciprocal teaching and
• An *expert group* for preparing the teaching they must do themselves.

When numbers get huge, a design conflict emerges...

Jigsaw and scaling up (2)

When numbers get huge, a design conflict emerges...

If you stay with each "expert" group authoring a unique topic, then the class cannot use all the material (and you get into social diffusion issues of which material spreads better).

If you stay with a small set of topics (perhaps the required curriculum), then the authors duplicate effort, not all versions are equally good, etc.

Jigsaw with 5,000

If you prioritise original authoring (of student-generated content), so that all students are involved in novel creation, then this content can only be used by a fraction of the class.
The interesting issue may then be that of social networking and whether news of the most interesting content spreads across the whole class.

If you prioritise real, interactive cross-tutoring and learning by students then different groups will create materials on the same topic with limited potential to converge on one best set. So their pride in doing original work will be somewhat less; but the whole class gets the same topics.

In both cases, each student personally does some teaching and some learning.

See: http://www.psy.gla.ac.uk/~steve/localed/jigsawpresent.html

Why bring up Jigsaw here?

One reason is a general research heuristic, which MOOCs motivate: to ask of every proposed learning design: what would this be like with huge numbers? (or with tiny numbers?). With Jigsaw, this brought out issues that had been hidden.
(This heuristic is related to Bloom's 1984 paper; and to Chi08's investigation of watching videos of 1:3 tutorials. Both papers reason about cost and learners-teacher ratios.)

The other reason: Jigsaw is a particularly strong form of peer interaction, and embodies the "learn by teaching" principle.
It does take a bit more admin. than other groupwork, so embracing it might require some group allocation tools to be created.
(It is easy to randomly allocate each student to one group. It is not so easy to allocate them to two different group types s.t. no two members of one group also share another, and so that between them they maximise second-order contact with other groups to get some report-back benefits, ...)