Speaker: Steve Draper

Dept. Psychology, Glasgow University

Link to the paper from this talk at:
http://www.psy.gla.ac.uk/~steve/

Title: From active learning to interactive teaching: Individual activity and interpersonal interaction

---

Abstract:

A. CSCLN
(Computer Supported Cooperative Lecture Notes)

B. PAL (Peer Assisted Learning)

C. PRS: Electronic Voting Systems and contingent teaching

D. Active learning and interaction

Is activity good for learning?

What is it about being "active" that promotes learning?

What is it about discussion with other people that promotes learning?

Or is it a waste of time? — after all, in computer programming 2 programmers only achieve about 1.1 times the work of 1 programmer.

CSCLN

(Computer-Supported Cooperative Lecture Notes)

Learners on a course divided into teams;
One team per lecture/meeting in the course
(perhaps one team to manage a contents page)

After each lecture, that team produces notes on the WWW for the whole class.

By the end, there is a public set of notes covering the whole course.

Pedagogicially:

- An experience of cooperative work mediated by IT (WWW, email)
- A practical exercise on WWW authoring
- Explores a Q&A format for notes:
  Learners were encouraged to describe their topic in terms of key questions, and their answers.
  (Cf. FAQ, AnswerGarden idea)

First Trial

Run on an (HCI) class of 59 students.

Evaluated (method: Integrative Evaluation)
Interviews, observation, questionnaires.
Main data: questionnaire at end of exam (because notes mainly used in revision)

98% response rate
84% had referred to the notes.
76% said they found them useful
69% said they were worth the effort their share had cost.
Rated them as third most useful resource, after past exam questions/solutions, and course handouts.

Exercise, associated teacher materials, the web notes produced by the students at:
http://www.psy.gla.ac.uk/~steve/HCI/cscln/overview.html

Educational pluses

- Authors re-process material in their minds
- Self-monitoring: compare others' notes to own understanding
- Teacher monitors his success by seeing the notes.
- Build community spirit

Three implementations so far

- The HCI (human-computer interaction) course
- A single workshop on study skills for postgraduate students
- A philosophy course by Susan Stuart

What does it take to put on?

- Students to have web space
  (disk space is now tiny cost; web servers are nearly free)
- Students trained to do web authoring:
  but WORD will write out HTML.
- Must begin, right at the start, by announcing the exercise, and assigning jobs (no volunteers: just arbitrarily dictate teams and assignments).
- May have to give assessment credit for the task to gain compliance.

Instructions to the students

The task is to create a short summary of the lecture to which the team was assigned in a public document (a web page), that you feel would be useful as a revision note for all students. The format requested is to find the key question or questions which the lecture could be said to answer, plus a good answer to it.....

Almost no excuses short of a coma lasting several weeks will be valid. If you miss the lecture, you need to discover and make notes on what went on even more and will have a usefully detached position as an editor. ....

The team is responsible for producing the page, but should draw as much as possible on everyone in the class, so as to get the best content, and make it useful to as many people as possible. To do this, besides discussing within the team (face to face and by email), the team should conduct a discussion by email or other tool with the whole class. Although I may contribute, I will take at most a back seat in these discussions....

PAL (Peer Assisted Learning)

Background

- Developed in USA from 1973
  at University of Missouri-Kansas City
  as "Supplemental Instruction"
- Now offered at ≈60% of US universities
  (research-oriented)
- Introduced into the UK at Kingston University from 1990 in modified form as PAL.
- Now offered at about 20 UK sites.
- At Glasgow University introduced in 2003-4 in Psychology, in Computing the year before.

What is it?

Weekly meetings, like tutorials BUT run by students who did the course before, voluntary, often large amount of client determination of agenda.

Potential educational benefits of PAL

1. Extra information resource — supplemental instruction
2. Time on task: extra processing from generating a) the answer; b) explanations in discussion.
3. Peer interaction: benefits the explainer
4. "Auto-PAL": organising peer interaction for themselves, and so spending even more time on discussion and thinking.
5. Mentoring: information on how to be a successful student on this course.
6. Deep learning
7. Integration (Tinto): how at home at student feels
8. Reflection: practise not just doing learning but thinking about one's learning process.

Other points about PAL

- Benefit to the facilitators (student leaders) is even greater than to the "client" students
- Our experience this year suggests that group size is crucial: divide into groups of 3-5. Any smaller, and they expect the facilitator to tell them the answer; Any larger and most won't talk freely. But dividing on the spot works fine.
- Attendance: experience elsewhere suggests that often only about 10% attend in the first year of a scheme, but it grows slowly over the years.
- In our first session (just finished), we offered it to all four levels of students. Attendance quite low in level 1, but in level 3 it was persistently in the 10-30% range every week, and they have kept it going themselves without facilitators in the last period.

PRS: using Electronic Voting Systems (EVS) in classes at the University of Glasgow

Students in years 1 to 4

Audience sizes 20-300

Repeated use from once only to 24 sessions with the same class

Departments include:
Philosophy
Psychology,
Computing Science,
IBLS,
Medicine,
Physics
Vet School
Dental School

Types of pedagogic application of EVS

1. Formative assessment = feedback to Learners a) right/wrong b) rel. to rest of class.
2. Social formation of group; or create a sense of community of learners.
3. Formative feedback to Teacher;
   And contingent steering of occasion i.e. change what is done depending on audience response.

4. Initiate a discussion

4b. Especially in small groups

5. Summative assessment: formal
6. Summative assessment: practice
7. Peer assessment

8. Experiments using human responses e.g. psychology experimental demonstrations.

Two of the best uses for EVS

A] Initiating discussion e.g. Mazur method

B] Contingent teaching

This is where comes with a large set of possible questions forming in effect a diagnostic tree. Instead of a simple linear script, he selects the next question depending on the audience's response to the last question. This allows him to zero in on the right area for this particular audience.

Why use EVS? — initial idea

Main problem with large classes (thought to be)
Lack of interaction, extreme passivity

A simple theory of learning: it depends on the time spent by learner actually thinking about the topic (not listening, not taking dicatation, but processing or using the concepts). Answering questions at least requires this.

Active learning for individuals

Does this mean physical action?

- Break a class every 20 minutes and move around
- Count the number of button presses in an "interactive" computer program
- Doing a science lab. by following the instructions.

Does it mean mental activity?

- Working out what someone means
- Having to choose the answer to a question, or which button to press.

=> Physical activity is only helpful to learning if choosing a physical action requires mental activity: automatic button pressing doesn't help.

Peer promoted learning

All the three techniques above (CSCLN, PAL, EVS) involve "peers": interacting with other learners. How can they be important to learning?

- They act as a social prompt to action, like exercise classes.
- People offer challenges to your assumptions (as scientific experiments do): opinions and facts you weren't expecting that make you change your theories.
- Even in simple discussions, they require you not just to choose an answer (like an EVS does), but to produce an explanation for it. Generating explanations is even more powerful than generating an action as a mental activity that promotes learning.

True interaction: contingent action

I'd like to suggest:

- Learning comes from mental activity: doing new processing with the material

- Having to generate new actions is one way of prompting this mental activity;
  Another is having to give explanations.

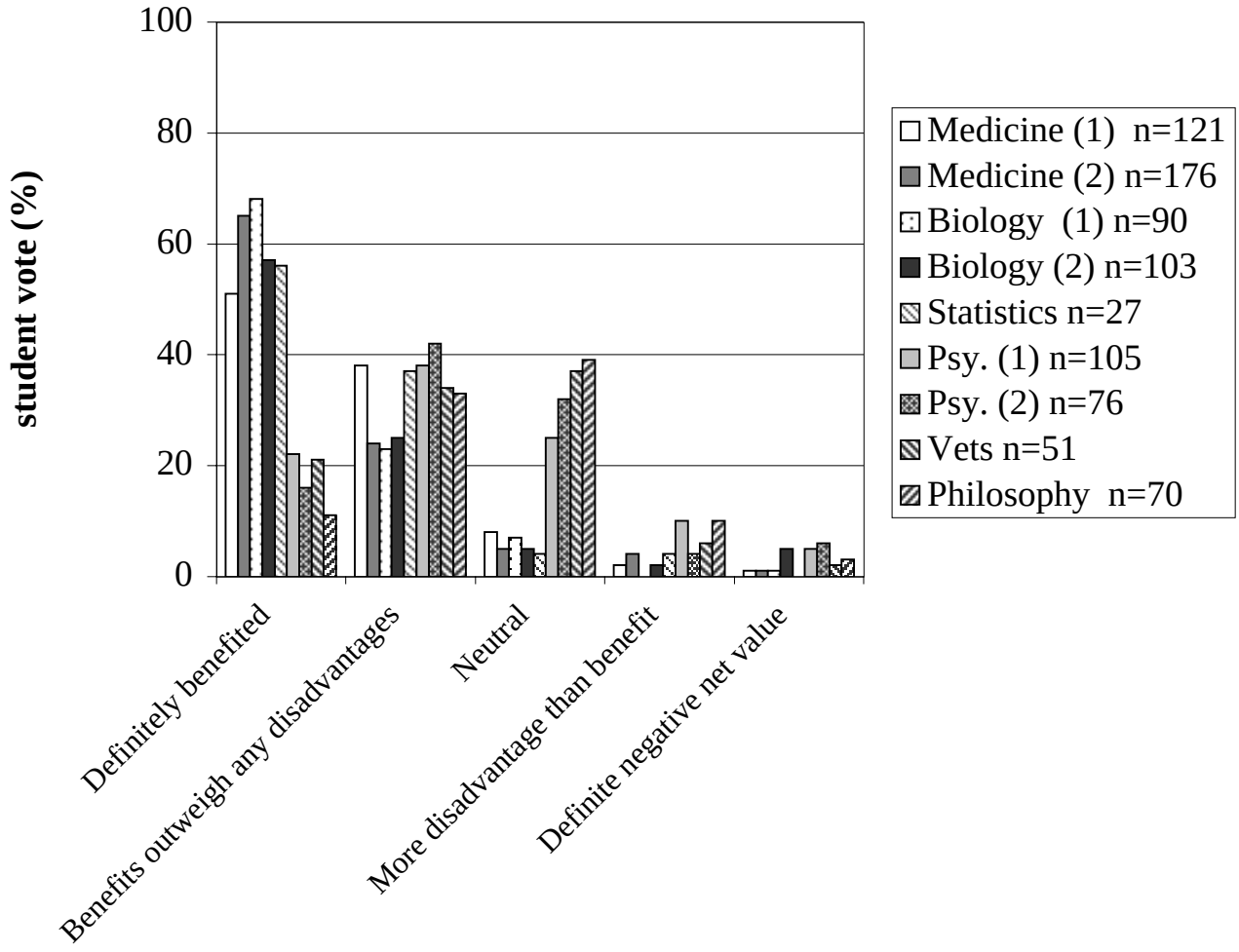
True interaction means that what one person does depends on what the other person last did.

- The real value of a teacher — as opposed to a book — is only realised if there is interaction i.e. contingent action, where what the teacher does depends on what the learner does.

- We do this all the time in conversation;
- Students do it in small group discussions;
- The trick is to do it in a large class, and depends on tracking what they are all thinking.

Department ***** some evaluation carried out	**Class**	**Approx. number in class (not all attended session)**	**Number of Sessions**
* Computing Science	Level 1 2001-02	450	20 x 2
	Level 1 2002-03	300	20 x 2
Computing Science	Level 4	70	1
* Psychology	Level 4 Education	40	3
* Psychology	Level 4 HCI	30	8
* Psychology	Level 1	500	3 x 2
* Philosophy	Level 2 Logic	100	9
* Philosophy	Level 1 Mind & Body	260	1
*Medicine	Level 3	250	3
*IBLS (Biology)	Level 2	300	1 x 2
*IBLS (Biology)	Level 2	150	1
*Veterinary Medicine	Level 4	100	1
*Dental School	GP's (short course)	18	1
Medicine	Level 4	250	1
*Statistics	Level 1/ Level 2	200	9

Perceived net benefit of handsets



PAL can improve exam marks

PAL has sometimes improved exam marks significantly. This table shows results from a PAL scheme for a first year course in Chemistry at Manchester in 1997-8. Exam marks went up with the amount of PAL attended, but was independent of the students' general aptitude at Chemistry as measured by their previous (A-level) exam results.

	No. of students	Mean No. of attendances	Mean Exam results	Mean A-level points
Non-participants	27	0	47.3	13.8
Occasional Participant (attended 1-5 sessions)	34	2.7	51.9	11.8
Full participant (attended 6-14 sessions)	65	9.6	60.7	13.7
All students	126	5.7	55.5	13.2

Table 1. A comparison of examination results between PASS participants and non-participants at Manchester for the 1997-98 academic year.

Coe et al. (1999) www.ucl.ac.uk/epd/pal/ManUMISTpaper.html

Notes: Figures do not include those students who were absent for one or more exam (18); Based on the average of the final examination marks for the three chemistry courses covered by the PASS scheme (i.e. organic, inorganic and physical); Mean points calculated from each student's chemistry and best other science or Maths A-level results

---

Some papers you might want to look at include:

- The one above, which gives the table above.
- http://www.umkc.edu/centers/cad/si/sidocs/pbstat94.htm
- http://www.tedi.uq.edu.au/conferences/teach_conference99/papers/Playford