Rousing the Dead:

Getting students to come to, stay awake in and even participate during large lectures

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The way things are ….

"Despite the changes in the learning environment, teaching methods do not appear to have changed considerably.

Initial findings from research suggest that many staff still see teaching primarily in terms of transmission of information, mainly through lectures."

Dearing, National Committee of Enquiry into Higher Education: Dept. for Education 1997.

Outline

- An overview of technical, logistical and pedagogical challenges
  - Hardware / software issues
  - How have you used them?
  - What we have learned?
- Some use-scenarios
- Some practice!

Some terminology

- A “clicker”, a.k.a.
  - An Electronic Voting System
  - A Personal Response System
  - An Audience Response System
  - ….

What do you know about them?

- What is your experience of clickers?
  1. Not familiar with them at all (but interested)
  2. Vaguely heard of them
  3. Seen them in use / know someone who's used them
  4. Used them myself

Interactivity…the essential ingredient

“ *The complex cognitive skills required to understand Physics cannot be developed by listening to lectures…*

… any more than one can learn to play tennis by watching tennis matches.”

Hestenes, D. Am. J. Phys., 66, 465-7 (1998)

Technical considerations (1)

- Which system should I buy? IR or RF

	Infra-Red	Radio Frequency
Indicative cost for class of 200	~£5k (200x£20 + 4X£250)	~£10k (200x£50 + £500)
Pros	▪ Relatively cheap ▪ Local experience, user base	
Cons	▪ Line-of-sight to receiver ▪ Multiple receivers / jamming and siting	

http://www.abernet.org.uk/bigdownloads/Falkirk.pdf

Technical considerations (2)

- We have ~8 lecture theatres cabled up for use with IR receivers

- College buy handsets, issued to students via the library

The much-maligned MCQ

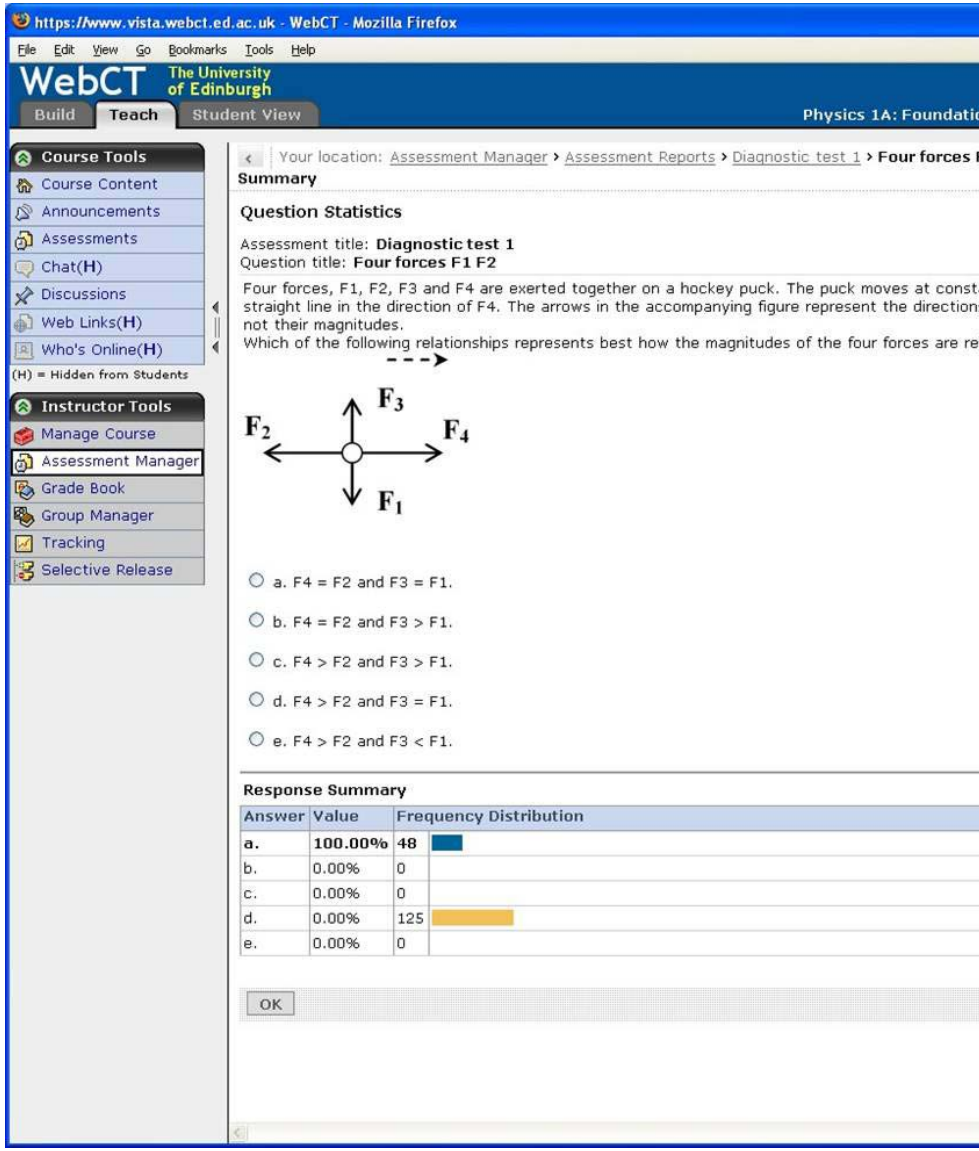
"Although multiple choice questions may seem limiting, they can be surprisingly good at generating the desired student engagement and guiding student thinking.

They work particularly well if the possible answers embody common confusions or difficult ideas."

Wieman, C. and Perkins K., Physics Today (2005) 36-42.

Pedagogy

- What makes a good question?
  - Concept-testing
  - Where known misconceptions live
  - Spread of answers expected



Pedagogy

- What if you don't know what misconceptions exist?
  - Get students to tell you; the "1 minute paper"
  - Feedback loop from end-of-course assessment
  - DUMP

Using them effectively

"Electronic classroom response systems....are merely tools, not a 'magic bullet'.

To significantly impact student learning (they) must be employed with skill in the service of a sound, coherent pedagogy.

This is not easy."

Beatty, I.D., Gerace, W.J., Leonard, W.J., Dufresne, R.J., Am. J. Phys in press 2006

Use scenarios (1)

- The “friendly” question
  - *“ What is your background study of subject X? ”*
  - Useful as a test-how-it-works question early on
  - Can address attention span limit in lectures

Use scenarios (2)

- The recap question
  - “ *In the last lecture we covered Y; let’s see what you can recall* ”
  - Can be useful at the start of a lecture to engage
  - Use to reinforce key concepts.

http://www.ph.ed.ac.uk - Time To Think - Mozilla Firefox

Time To Think

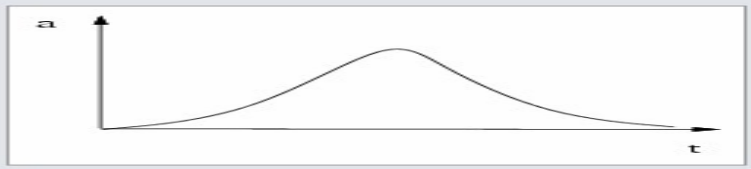
Think about the question below. Only one of the answers listed is correct. In the relevant lecture, you will all be asked to vote on which answer you think is correct.

A ball initially at rest in the hand, is thrown upwards, comes back down and is caught.

Which of the following represents a plausible graph of vertical **acceleration** against time?

1

2



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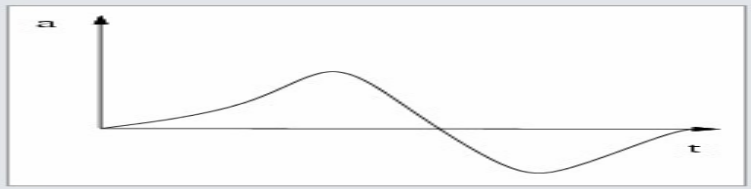
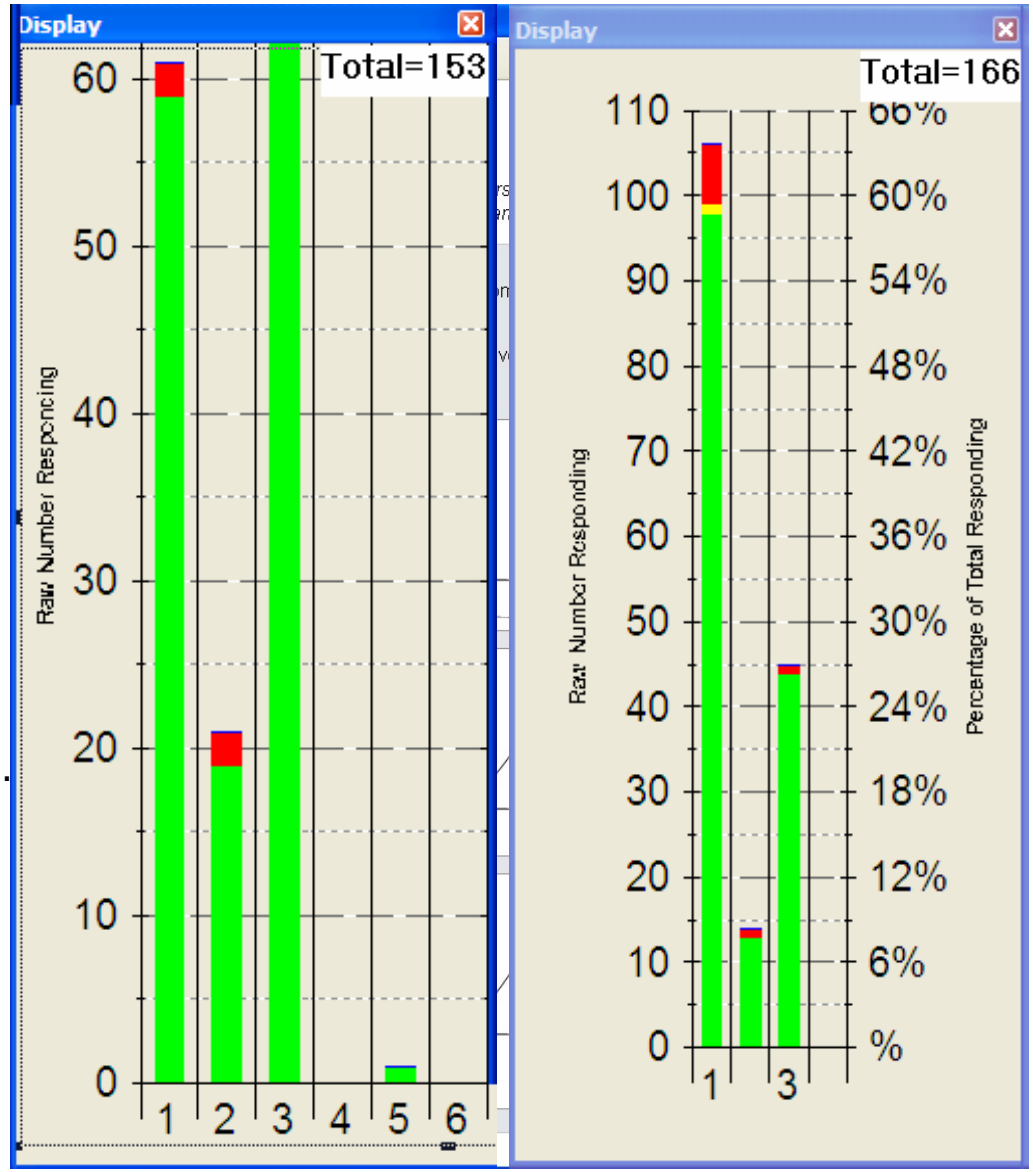


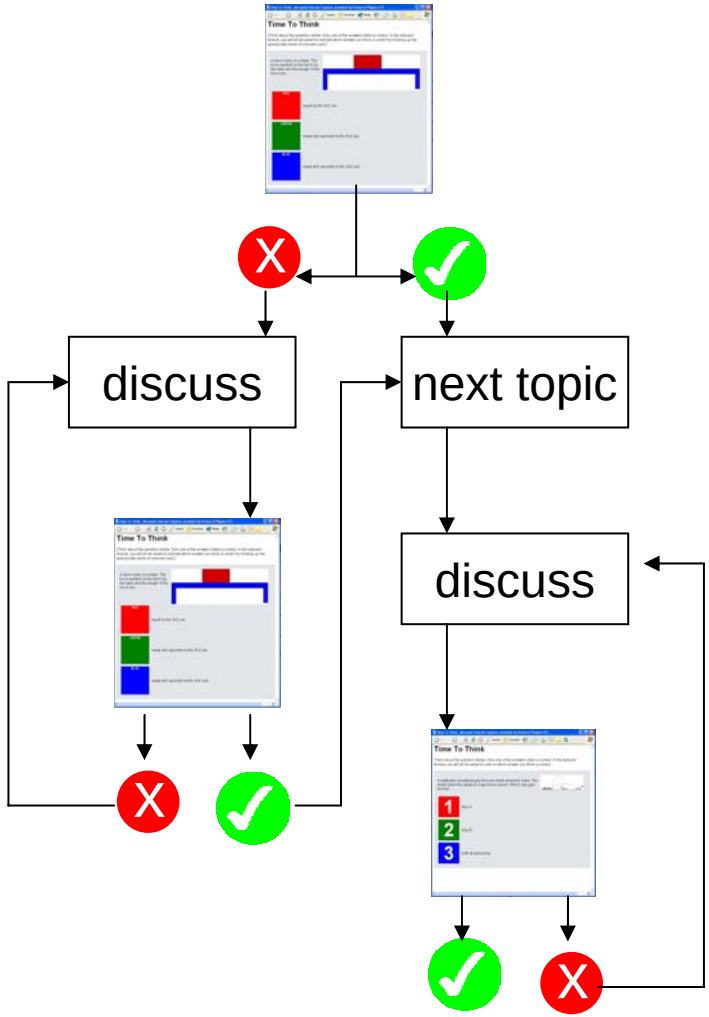
Use scenarios (3)

- Peer Instruction
  - Question
  - Individual poll
  - Hint;
    what you need to remember is…
  - Students discuss
  - Repoll



Use scenarios (4)

- "Contingent teaching"
  - Questions as branch points in lecture
  - Student responses dictate direction of next section
  - Two-way information flow utilised to shape the direction of the lecture



Consequences

- The reduction in coverage
  - Departure from the A-Z content transmission
  - The A-Z must be elsewhere (book, web, tutorial…)
  - The students must buy-in to “the learning contract”

Do's and (implicit) don'ts

- The first lecture is crucial
  - *Why we are doing this*
  - *What we expect of them*
  - *Practice use with friendly questions*
- There is a learning curve
  - *This is not an "out of the box" solution*
  - *Whole-team buy-in*

Do's and (implicit) don'ts

- What makes a good question ?
- How many to have each lecture ?
- Where to place it / them ?
- Beware shoe-horning content in

Sound advice

"Our most important piece of advice is to pay critical attention to what happens when you do it.

Your students are your best teachers"

Beatty et al, ibid.

Do's and (implicit) don'ts

- Talk to students and reflect

From a focus group, asking about use in other courses :

"…more varied in topics but yes to use it in ODL. They felt it would be particularly useful in QLS and perhaps chemistry"

From a discussion forum :

"I like them, it helps hold your attention and shows up the areas where students are likely to make mistakes or misunderstand, then they're explained further."

Your impressions

- Compared to half an hour ago, I am now:

1. More convinced of the potential of these for engagement in large classes
2. About the same
3. Less convinced

Your view

- My view of the potential of this for my teaching is :

(1) useless → (2) → (3) average → (4) → (5) excellent

DUMP - Browse/Search Category | Re: [css-d] Re: [babble] Screen/...

THE UNIVERSITY of EDINBURGH
SCHOOL OF PHYSICS

University Homepage
School of Physics Homepage

Database of Useful MCQs for Physics

Browsing Category 'Energy and Work'

Return to Category List

Showing Questions 1 to 10 of 27.

Go to page 1 | 2 | 3

My Question Bundle

1. Multiple resistors Remove
2. Light ray Remove
3. Centre of mass of a shape Remove
4. Newton's 3rd Law Remove
5. Cycle race Remove
6. Swinging pedulum Remove

Go To Bundle Editor

Search Titles for: energy Go ☑ Search Question Text as well

Keyword Filter

- ☑ acceleration
- ☑ calculation
- ☑ circular motion
- ☑ conservation
- ☑ conservative force
- ☑ definition
- ☑ dimensions
- ☑ dot product
- ☑ energy
- ☑ forces
- ☑ friction
- ☑ gradient
- ☑ graph
- ☑ gravity
- ☑ kinetic
- ☑ mass

Dangerous Sports — Add to My Bundle | Try Out

A man jumps off a $100\,m$ cliff and falls to the ground. Neglecting air resistance, is his total energy just before impact greater, smaller or the same as before jumping? ...

Kinetic Energy of Falling Balls — Add to My Bundle | Try Out

Two balls, one twice the mass of the other, are dropped to the ground from the same height. The effects of air resistance are negligible in these particular events. Just before hitting the ground, the heavier ball has ...

Frisbee — Add to My Bundle | Try Out

During an Ultimate Frisbee tournament, a $75g$ frisbee is thrown from a point 1.5 m above the ground with an initial speed of $15ms^{-1}$. At some point in its flight it has a height of $2.25m$ and a speed of $12ms^{-1}$. How much of its mechanical energy has been dissipated by air drag? [Take $g = 9.8ms^{-2}$, and assume that there is no significant change in the rotational energy of the frisbee between the two points.] ...

http://www.ph.ed.ac.uk/dump

Group activities

- In groups of 4-6, come up with (at least!) 1 good question based on your own teaching
- If a mixture of disciplines, go for LCD
- Include distracters, feedback etc
- Nominate a spokesperson to present (2 mins)

DUMP2.0

- From successful DevProj to sustainable community resource
- Building a community of users with a content ecosystem.
- Virtual community utilising Web2.0 tools.
- Please visit http://www.ph.ed.ac.uk/dump to register and explore.

Further details

- E-learning showcase

http://www.ph.ed.ac.uk/elearning

- Steve Draper, Psychology, Glasgow

http://www.psy.gla.ac.uk/~steve/ilig/

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