Personal response systems and learning

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Outline

- Interactivity in lectures – the evidence
- Voting systems
- Demonstration
- Our experience at Leicester
- Reaction from students
- Suggestions for using voting

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Evidence for engagement

Hake (1999) Dept Physics, Bloomington, Indiana

'Interactive-engagement versus traditional methods: A six-thousand student survey of mechanics data for introductory physics courses'
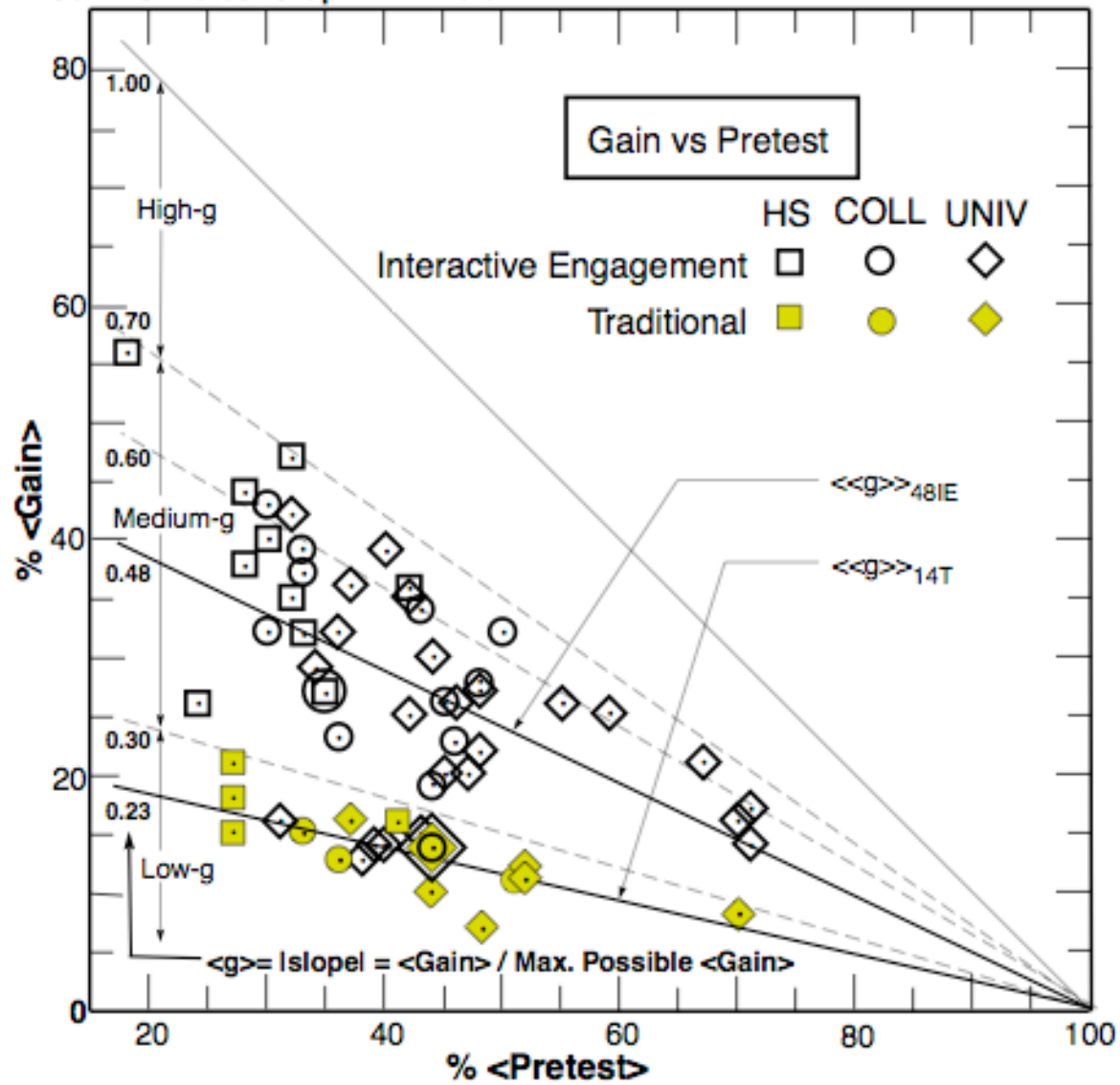
From Hake (1999) Figure 3

Electronic voting in lectures

- 1947 Holland and Belgium
  - one button hard wired system (Poulis et al, 1998)

- 1998 Strathclyde University
  - Jim Boyle, Mechanical Engineering
  - JISC case study

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Example systems

- <u>Keepad and Turning Point</u>
  - Works with PowerPoint, radio
  - Receivers £300, handsets £30-40 each
  - Software free
- <u>Interwrite PRS</u>
  - Infra red, Strathclyde University*
  - Stand alone software can be integrated in PowerPoint

Shall we have a go?

What is your subject specialty?

1. Plant sciences
2. Zoology
3. Genetics
4. Microbiology
5. Physiology
6. Biochemistry

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What is your subject specialty?

19%	1.	Plant sciences
6%	2.	Zoology
13%	3.	Genetics
6%	4.	Microbiology
39%	5.	Physiology
16%	6.	Biochemistry

What time this morning did you set off to get here ?

1. 5.00 am
2. 6.00 am
3. 7.00 am
4. 8.00 am
5. 9.00 am
6. Too early to remember
7. I don't use a watch

What time this morning did you set off to get here ?

0%   1. 5.00 am

17%   **2. 6.**00 am

0%   3. 7.00 am

67%   **4. 8.00 am**

17%   **5. 9.**00 am

0%   6. Too early to remember

0%   7. I don't use a watch

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How easy is it to create a voting slide?

1. Very easy
2. Easy
3. Not easy
4. Hard
5. Very hard

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How easy is it to create a voting slide?

45%   1. Very easy

35%   2. Easy

0%   3. Not easy

3%   4. Hard

16%   5. Very hard
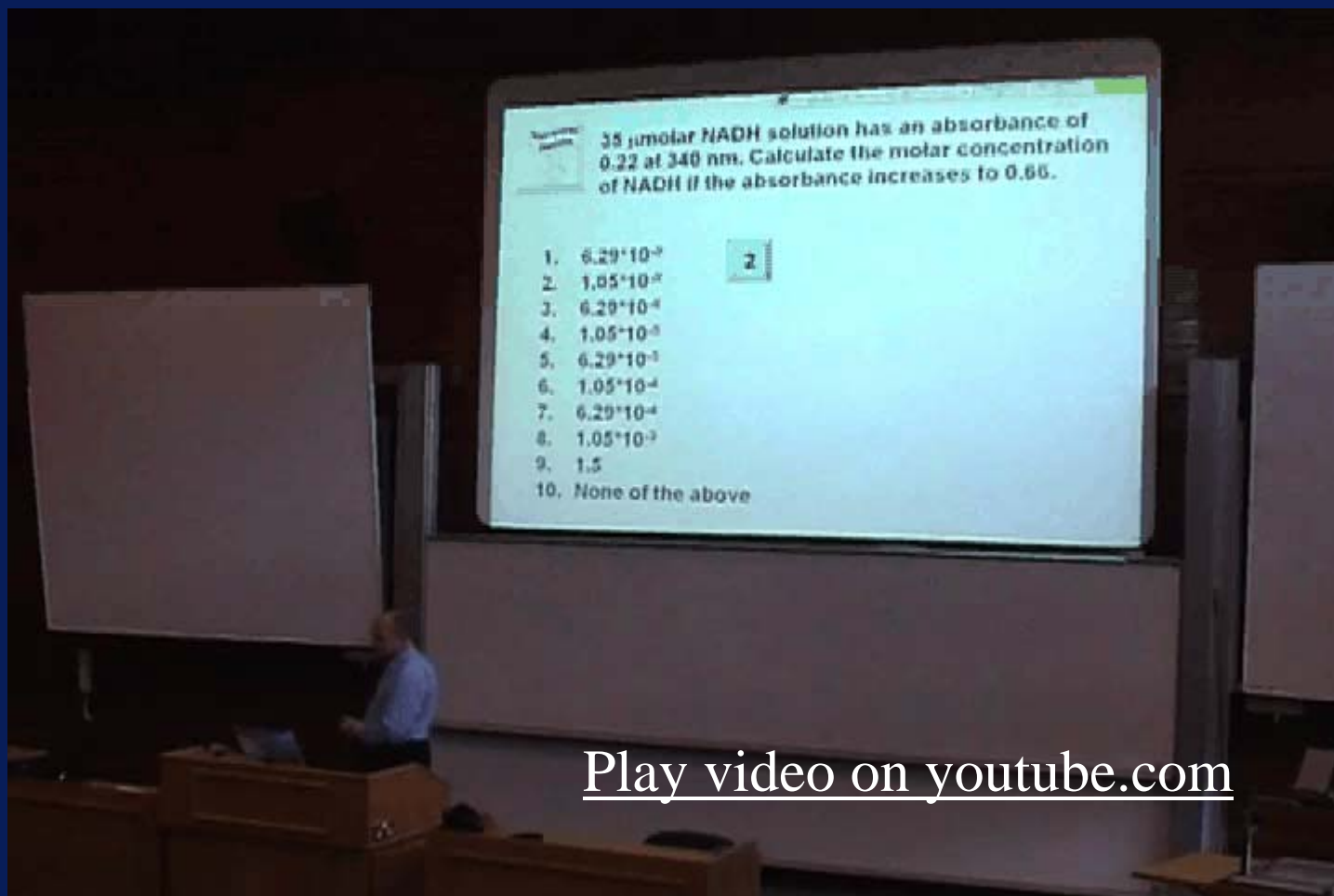
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- 160 first year undergraduates
- Biological sciences, medical biochemistry, medical genetics, medical physiology
- £10 deposit for handset (value £35)
- Collection on first day of term

Leicester first year students

- Key skills and communication
  - Lecture break, plagiarism exercise, survey
- IT and numeracy
  - Test questions prior to assessment
- Biochemistry dry practical
- Feedback on biochemistry formative assessment (short answers)

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IT and numeracy questions in action
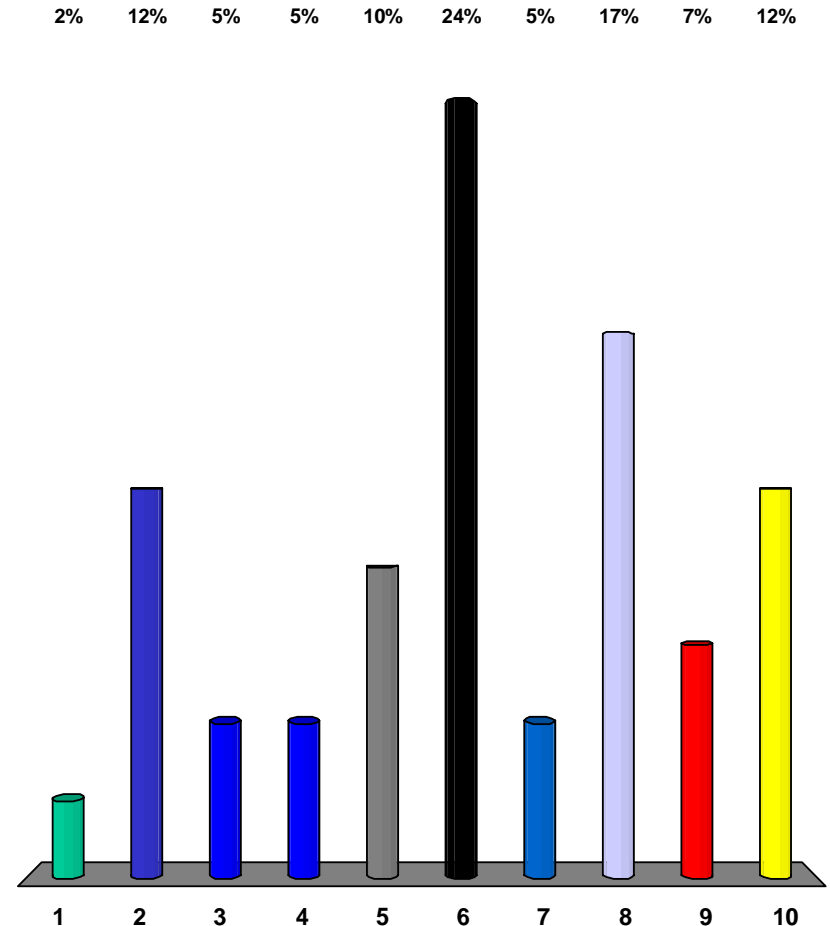

Play video on youtube.com

35 μmolar NADH solution has an absorbance of 0.22 at 340 nm. Calculate the molar concentration of NADH if the absorbance increases to 0.66.

1. $6.29*10^{-9}$
2. $1.05*10^{-8}$
3. $6.29*10^{-6}$
4. $1.05*10^{-5}$
5. $6.29*10^{-5}$
6. $1.05*10^{-4}$
7. $6.29*10^{-4}$
8. $1.05*10^{-3}$
9.   1.5
10. None of the above

35 μmolar NADH solution has an absorbance of 0.22 at 340 nm. Calculate the molar concentration of NADH if the absorbance increases to 0.66.

1. 6.29×10^{-9}
2. 1.05×10^{-8}
3. 6.29×10^{-6}
4. 1.05×10^{-5}
5. 6.29×10^{-5}
✔6. 1.05×10^{-4}
7. 6.29×10^{-4}
8. 1.05×10^{-3}
9. 1.5
10. None of the above

2%	12%	5%	5%	10%	24%	5%	17%	7%	12%
1	2	3	4	5	6	7	8	9	10

35 μmolar NADH solution has an absorbance of 0.22 at 340 nm. Calculate the molar concentration of NADH if the absorbance increases to 0.66.

35 μmolar = $3.5*10^{-5}$ M

A = E c l   where l is the length of the path through the sample, c is the concentration of absorbing molecules in that path, and E is the extinction coefficient.

A = E c l   so   E = A / c l

E = $0.22/3.5*10^{-5}$ * 1 = 6285.71 (the absorbance of a one molar solution of a pure solution at a specific wavelength in a cuvette with a 1 cm path length), so:

A = E c l   and   c = A / E l
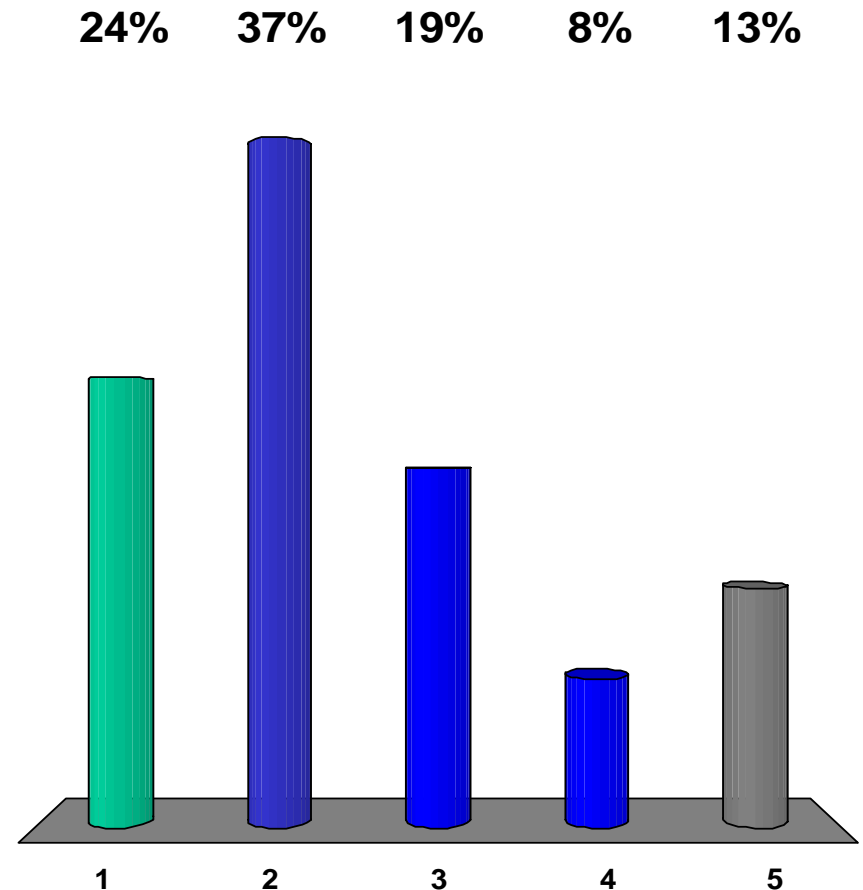
= 0.66/6285.71 * 1

= $1.05*10^{-4}$ M (= 105 μmolar)

The use of voting in these lectures has increased my understanding of the topics.

1. **Strongly Agree**

2. **Agree**

3. **Neutral**

4. **Disagree**

5. **Strongly Disagree**

The use of voting in these lectures has increased my understanding of the topics.

Survival Guide

1. **Strongly Agree**
2. **Agree**
3. **Neutral**
4. **Disagree**
5. **Strongly Disagree**

24%	37%	19%	8%	13%
1	2	3	4	5

What do students think about it?

- Video clip of students reactions on leaving a class which involved them using clickers (not available in this online version)

Written feedback from students

'I did find it useful testing my own knowledge as it showed me how much information i had actually taken in and how much of the topic i had understood'

'When used correctly with decent questions it's a nice change of pace and encourages us to pay more attention to the point that's being made. Sometimes funny/interesting to see what the results show in graph/chart form too'

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Feedback from staff

8 staff surveyed

- all would use it again
- all thought students were more engaged
- Comments – novelty value? no impact on attendance, students disappointed if not used

Response rates

Highest 112 (class of 160)
Recurrent use 63

Key skills & Communication module

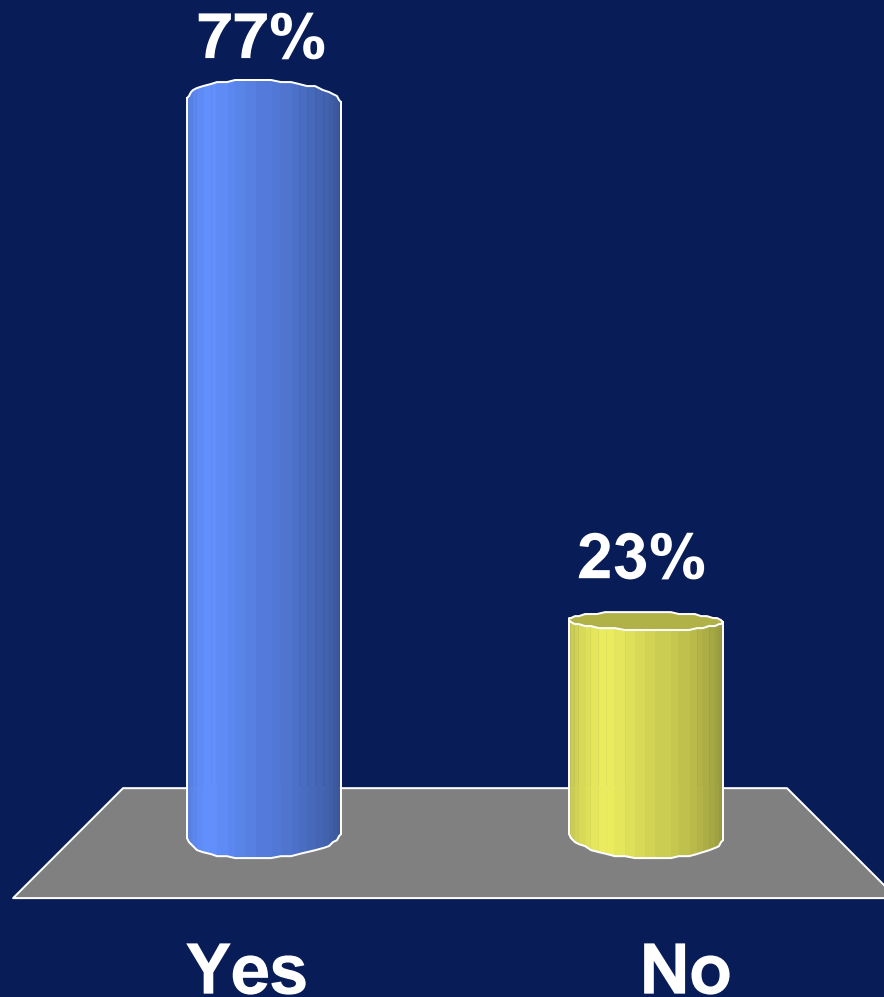| 8 October	63
3 December	54

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Suggested uses

- Lecture break
- MCQs – concepts, understanding, recall
- Repolling – peer instruction
- Redirection – alternate lecture paths
- Community building
- Formal assessment
- Discussion - ethics
- Attendance
- Instant feedback on your lectures!

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Resources

Steve Draper's pages (Glasgow)
http://www.psy.gla.ac.uk/~steve/ilig/

References used, all links last accessed 6/12/07:

Draper,S.W., Cargill,J., & Cutts,Q. (2002) "Electronically enhanced classroom interaction" *Australian journal of educational technology* vol.18 no.1 pp.13-23
http://www.psy.gla.ac.uk/~steve/ilig/handsets.html

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand student survey of mechanics data for introductory physics courses. *American Journal of Physics* vol.66 pp.64-74 pdf

JISC case study on use in engineering Jim Boyle at Strathclyde, includes short video
http://www.elearning.ac.uk/innoprac/practitioner/strathclydevid.html

Poulis, J. Massen, C. Robens, E. & Gilbert, E. (1998) "Physics lecturing with audience paced feedback" *Am.J.Physics* vol.66 pp.439-441
http://www.bedu.com/Publications/PhysLectAPF.html

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