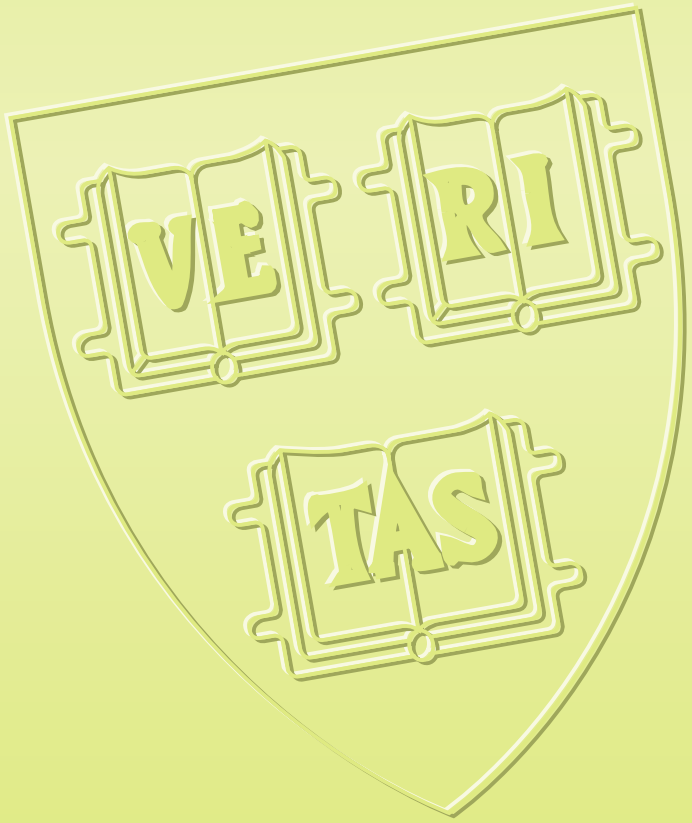
Engaging students in the classroom



Eric Mazur
Physics

14 May 1999
Harvard Business School

My point

Technology is not a magic bullet

A brief history of Information Technology

- blackboard
- overhead projector
- television
- computer

A question

What's wrong with old methods for presenting content?

The Psalms Scroll of Qumran Cave 11

Book of Hours
Valencia, c. 1460

Belles Heures du Duc de Berry
1408-09
The Way to Calvary

subsequuntur. Similiter et facta bona manifesta sunt: et que aliter se habent abscondi non possunt. VI

Quicumque sunt sub iugo servi dominos suos omni honore dignos arbitrentur: ne nomen domini et doctrina blasphemetur. Qui autem fideles habent dominos non contempnant quia fratres sunt: sed magis serviant quia fideles sunt et dilecti: qui beneficii participes sunt. Hec doce et exhortare. Si quis aliter docet et non acquiescit sanis sermonibus domini nostri ihesu christi, et ei que secundum pietatem est doctrine: superbus nichil sciens sed languens circa questiones et pugnas verborum: ex quibus oriuntur invidie contentiones blasphemie suspiciones male conflictationes hominum mente corruptorum et qui veritate privati sunt: existimantium questum esse pietatem. Est autem questus magnus: pietas cum sufficientia. Nichil enim intulimus in hunc mundum: haut dubium quia nec auferre quid possumus. Habentes autem alimenta et quibus tegamur: hiis contenti sumus. Nam qui volunt divites fieri incidunt in temptationem et la-

dominantium: qui solus habet immortalitatem et lucem inhabitat inaccessibilem: quem nullus hominum vidit sed nec videre potest: cui honor et imperium sempiternum amen. Divitibus huius seculi precipe non sublime sapere: neque sperare in incerto divitiarum sed in deo vivo qui prestat nobis omnia abunde ad fruendum: bene agere: divites fieri in bonis operibus: facile tribuere: communicare: thesaurizare sibi fundamentum bonum in futurum: ut apprehendant veram vitam. O thimothee depositum custodi: devitans prophanas vocum novitates et oppositiones falsi nominis scientie: quam quidam promittentes circa fidem exciderunt. Gratia tecum amen.

Explicit epistola prima ad thimotheum.

Incipit argumentum in epistolam secundam.

Item thimotheo scribit de exhortatione martirii et omnis regule veritatis: et quid futurum sit temporibus novissimis: et de sua passione: scribens a roma. Explicit argumentum. Incipit epistola secunda ad thimo-

Paulus apostolus ihesu christi per voluntatem dei secundum promissi-


PROLO
GEN ESIS

DISCORSI
E
DIMOSTRAZIONI
MATEMATICHE,
intorno à due nuoue ſcienze

Attenenti alla

MECANICA & i MOVIMENTI LOCALI,

del Signor

GALILEO GALILEI LINCEO,
Filoſofo e Matematico primario del Sereniſſimo
Grand Duca di Toſcana.

Con vna Appendice del centro di grauità d'alcuni Solidi.

IN LEIDA,
Appreſſo gli Elſevirii. M. D. C. XXXVIII.


but lectures have barely evolved…

The real problem

not delivery of information

but assimilation of knowledge

The key point

think about educational goals

before introducing technology

What constitutes effective use of technology?

- furthers educational goals
- facilitates new modes of learning
- investment commensurate with returns
- reusable and flexible

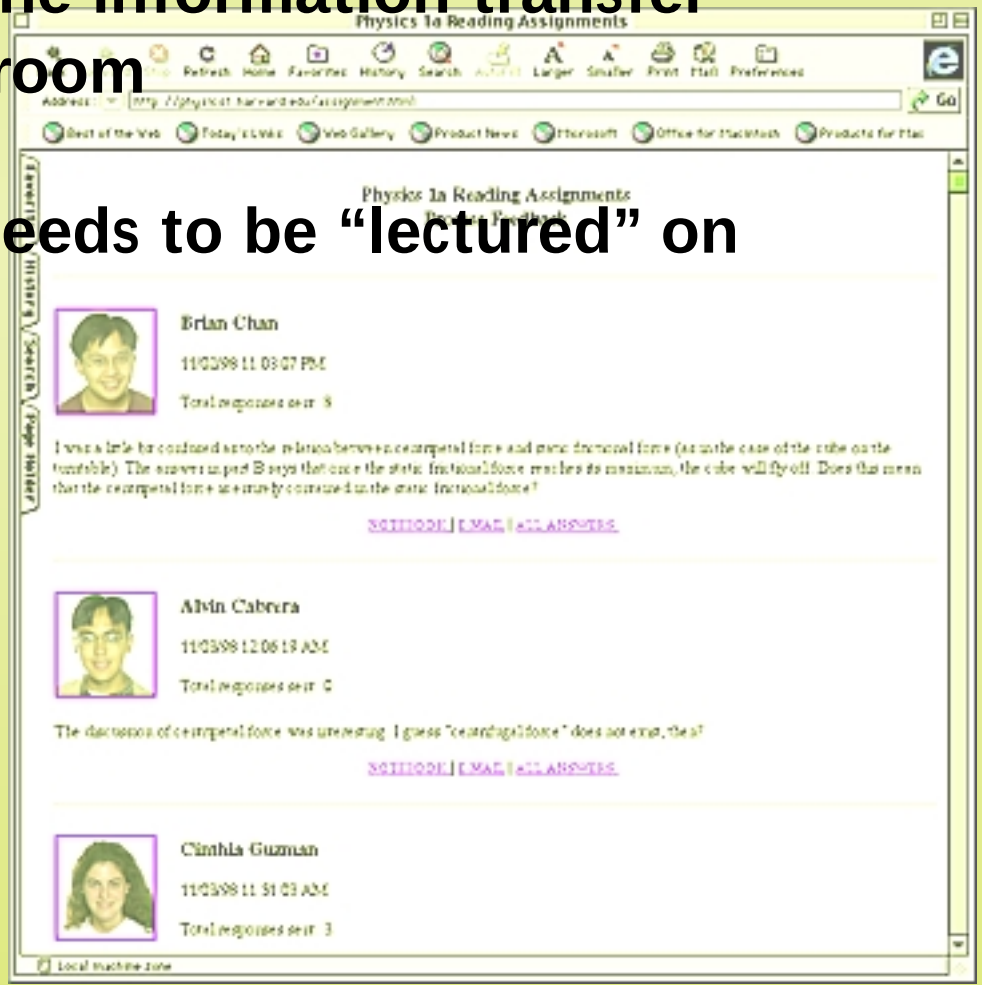
What problems can technology help with?

Large lectures…

- **are impersonal**
- **focus on information transfer**
- **don’t necessarily address students’ needs**

Just-in-time teaching

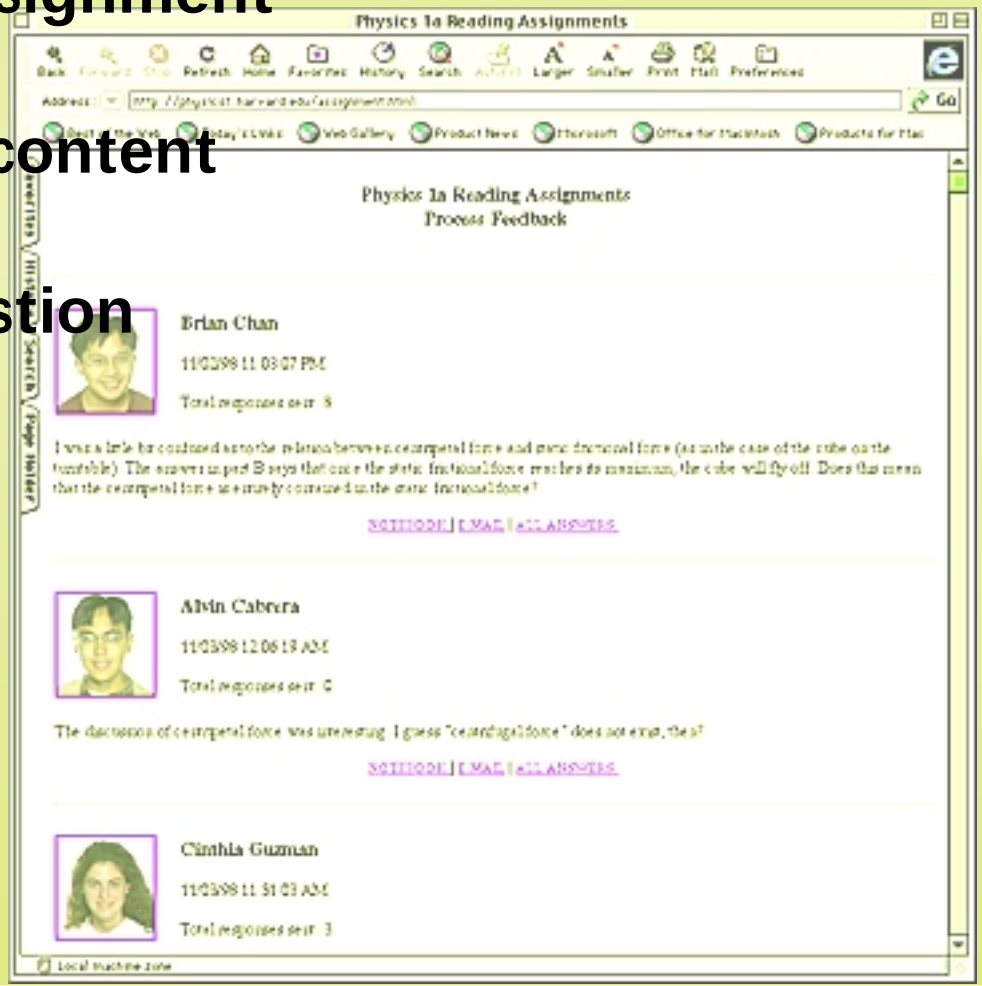
- move some of the information transfer out of the classroom
- find out what needs to be “lectured” on



Just-in-time teaching

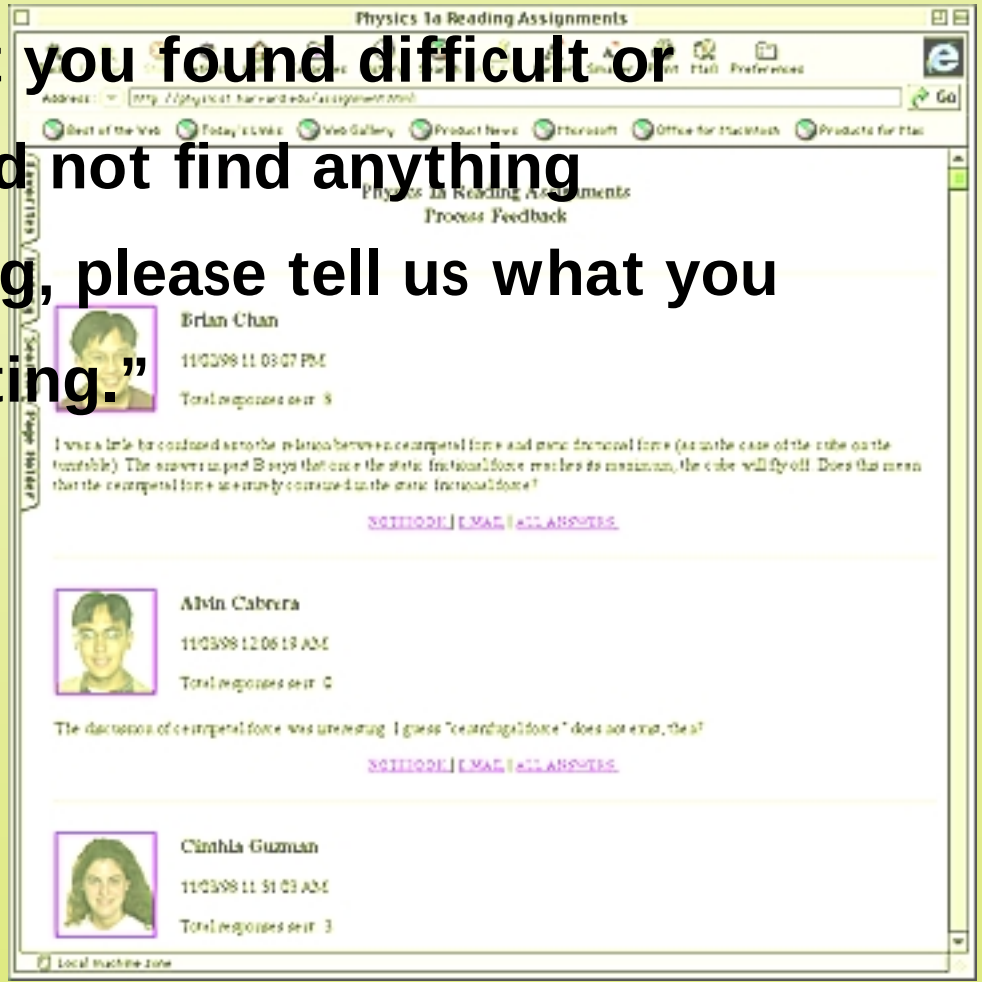
Pre-class reading assignment

- 2 questions on content
- 1 feedback question

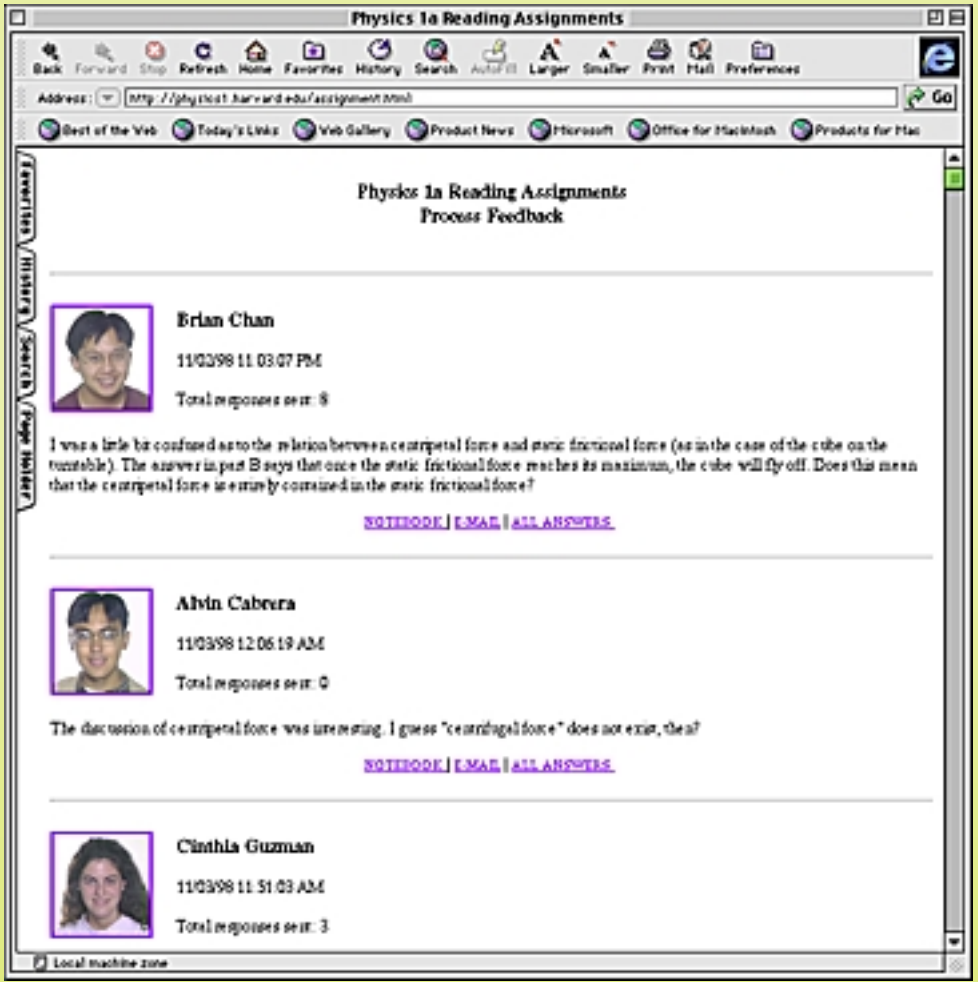


Just-in-time teaching

“Please tell us what you found difficult or confusing. If you did not find anything difficult or confusing, please tell us what you found most interesting.”



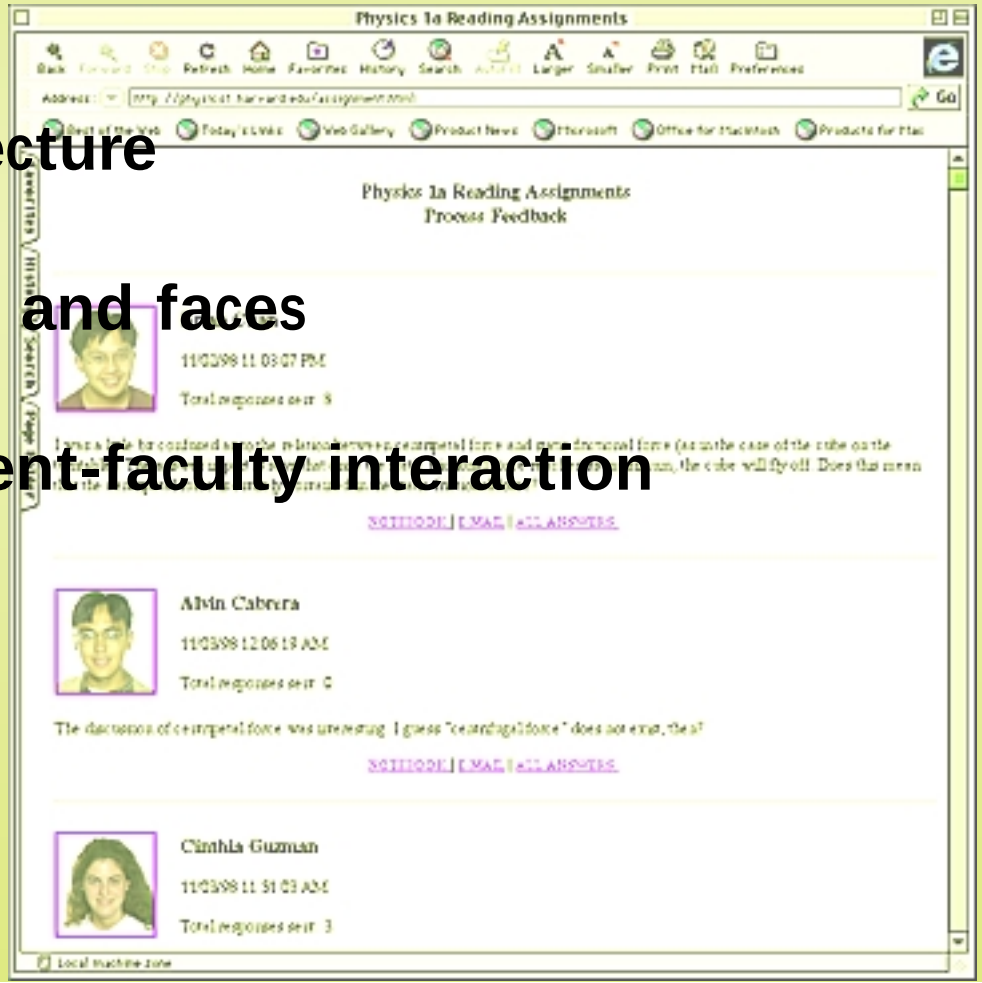
Just-in-time teaching



Just-in-time teaching

Benefits:

- more focused lecture
- connects names and faces
- additional student-faculty interaction



Personal response system

- keep students involved
- probe and address difficulties


1
2
3
4
5
6
7
8
9
H
0
L
PRS

Personal response system

Personal response system

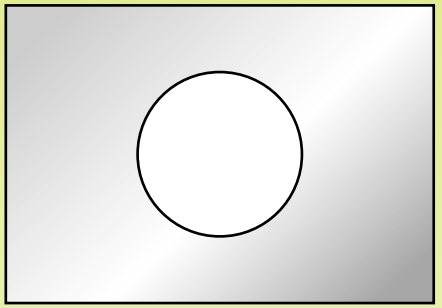
1. aim tip at nearest receiver

2. press button corresponding to answer

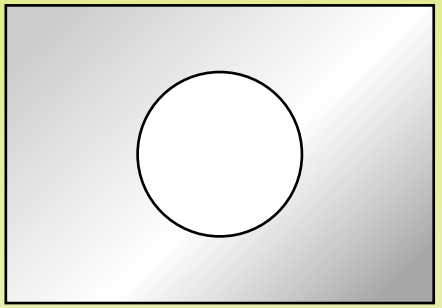
3. watch for your ID on screen

Personal response system

Consider a rectangular metal plate with a circular hole in it.



Personal response system



Consider a rectangular metal plate with a circular hole in it.

When the plate is heated so it uniformly expands, the diameter of the hole

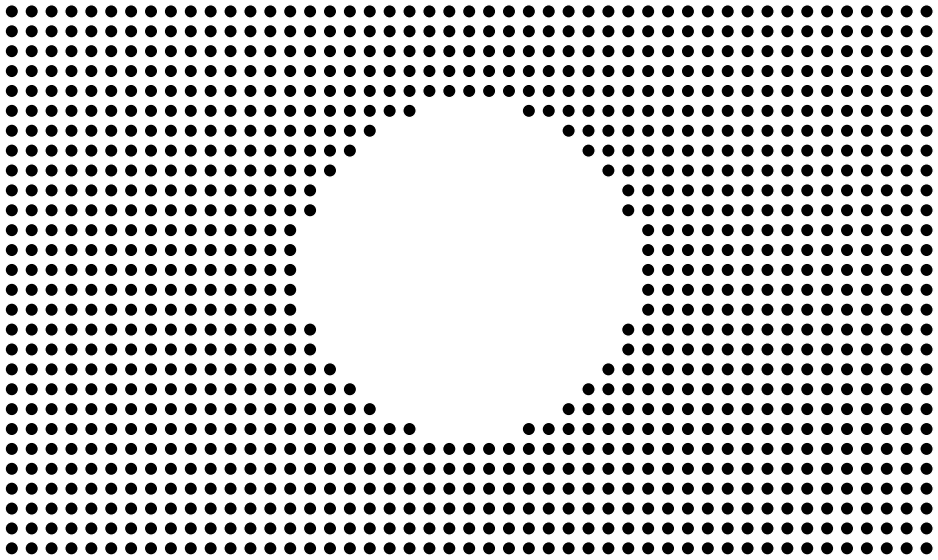
1. increases

2. stays the same

3. decreases

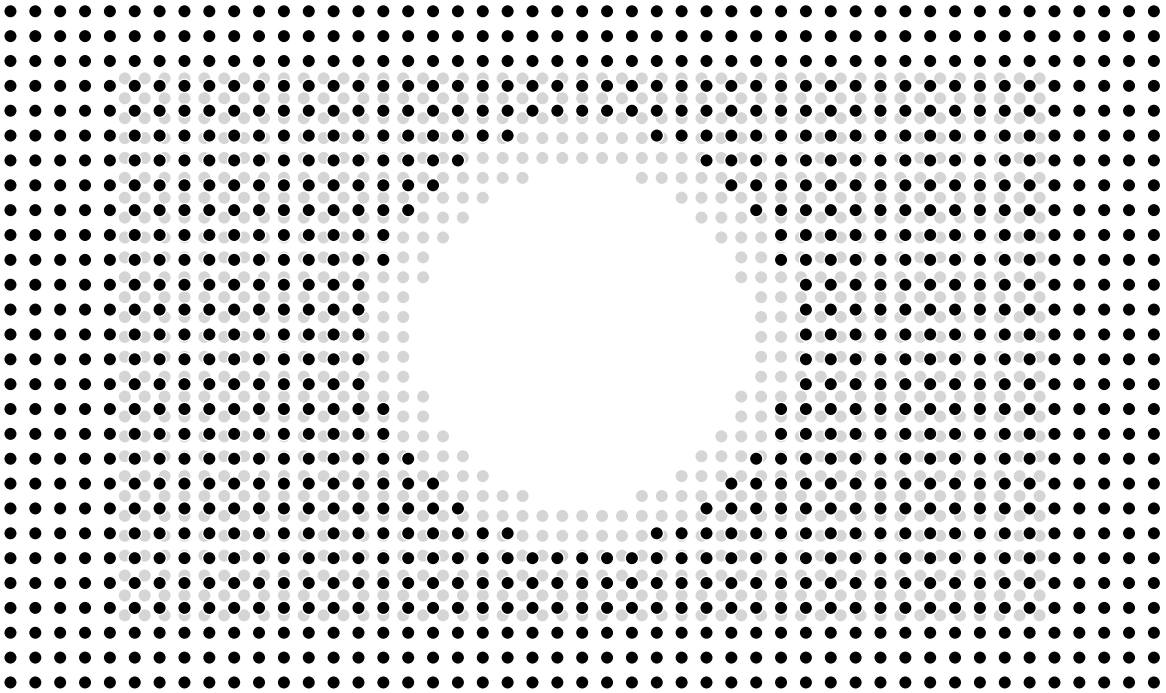
Personal response system

Just so you won't lose sleep:



Personal response system

Just so you won't lose sleep:



Personal response system

Benefits:

- **engages students**
- **gets students to cooperate**
- **provides real-time feedback**

A parting thought

we need *education* technology,

not just information technology

Acknowledgements

Dr. Catherine Crouch
Elizabeth Hess
Leo Donnely

For a copy of this presentation and additional information, see:

http://mazur-www.harvard.edu