Engaging students in the classroom

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Physics

4 February 2000
Classroom Committee Meeting

My point

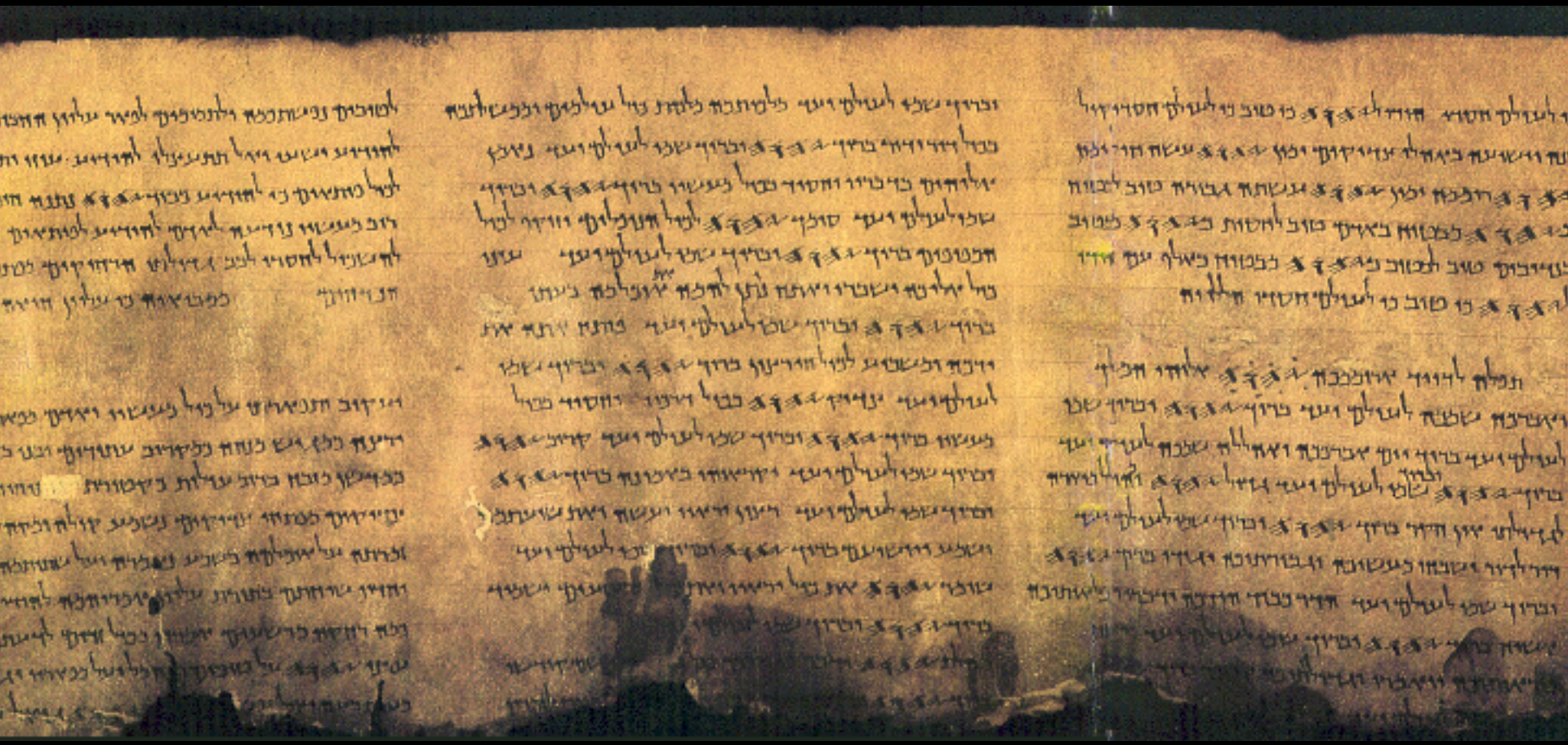
Technology is not a magic bullet

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

subtrahuntur. Similiter et facta bona
manifesta sunt: et que aliter se ha-
bent abscondi non possunt. VI.
Quicunq; sunt sub iugo seruitutis dominos
suos omni honore dignos arbi-
trentur: ne nomen dei et doctrina blasphe-
metur. Qui autem fideles habent dominos
non contemnant quia fratres sunt: sed magis
seruiant qm fideles sunt et dilecti: qm bene-
ficij participes sunt hec docete et exhortare.
Si qs aliter docet et non acquiescit sa-
nis seruonibus domini nri ihesu christi. et ei
que secundum pietatem est doctrine: superbus
nichil sciens sed languens circa questio-
nes et pugnas verborum: ex quibus oriun-
tur inuidie contentiones blasphemie su-
spiciones male-collationes hominum
mente corruptorum et qui veritate priuati
sunt existimantium questum esse pietatem. Est
autem quest9 magnus: pietas cum suf-
ficientia. Nichil enim intulimus in hunc
mundum: haut dubium qm nec auferre qd
possumus. Habentes autem alimenta et qbus
tegamur: his contenti simus. Nam qui volunt
diuites fieri incidunt in tentationem et la-
queum

diuinum: qui solus habet immortalita-
tem et lucem inhabitat inaccessibilem: quem
nullus hominum vidit sed nec videre potest:
cui honor et imperium sempiternum amen.
Diuitibus huius seculi precipe non sublime
sapere: neq; sperare in incerto diuitiarum
sed in deo viuo qui prestat nobis omnia abunde
ad fruendum: bene agere: diuites fieri in bo-
nis operibus: facile tribuere communicare:
thesaurizare sibi fundamentum bonum in
futurum: ut apprehendant veram vitam. O thi-
mothee depositum custodi: deuitans profa-
nas vocum nouitates et oppositiones
falsi nominis scientie: quam quidam promittentes
circa fidem exciderunt. Gratia tecum amen.
Explicit epistola prima ad thimotheum
incipit argumentum in epistolam secundam
ad thimotheum scribit de exhortatione
martirij et omnis regule veritatis: et qd
futurus sit temporibus nouissimis et de sua
passione: scribens a roma. Explicit argu-
mentum incipit epistola secunda ad thimo-
Paulus apostolus christi
ihesu iesu per voluntatem dei secundum pro-

subsecuntur. Similiter et facta bona
manifesta sunt: et que aliter se ha-
bent abscondi non possunt. VI.
Quicuq; sunt sub iugo seruitutis dños
suos omni honore dignos arbi-
trentur: ne nomen dei et doctrina blasphe-
metur. Qui
non determinat
seruiat qa fi
delibus participat
Si qa alit
nis seruorum
que sed in pi
nichil faciens
ones et pug
tur inuidie
spiciones m
mente corru
sue existimā
aut quest magnus: pietas cum suf-
ficientia. Michil enim intulimus in hunc
mundum: haut dubium qa nec auferre qd
possumus. Habentes autem alimenta et qbus
tegamur: his contenti simus. Nam q volunt
diuites fieri: incidunt temptationem et la-

diuinum: q solus habet immortalita-
tem et lucem inhabitat inaccessibilem: quem
nullus hominum vidit sed nec videre potest:
cui honor et imperium sempiternum amen.
Diuitibus huius seculi precipe non sublime
sapere neque speranda in incerto diuitiarum
is qui abunde
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omunicare:
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n vitam. Ut thi-
deuitans pha-
ppositiones
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abstinentiam
lem secundum
rehortatione
eritatis: et qd
futurus sit temporibus nouissimis: et de sua
passione: scribens a roma. Explicit argu-
mentum. Incipit epistola sancti paulli
Paulus apostolus iesu
christi per volunta-
tem dei

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

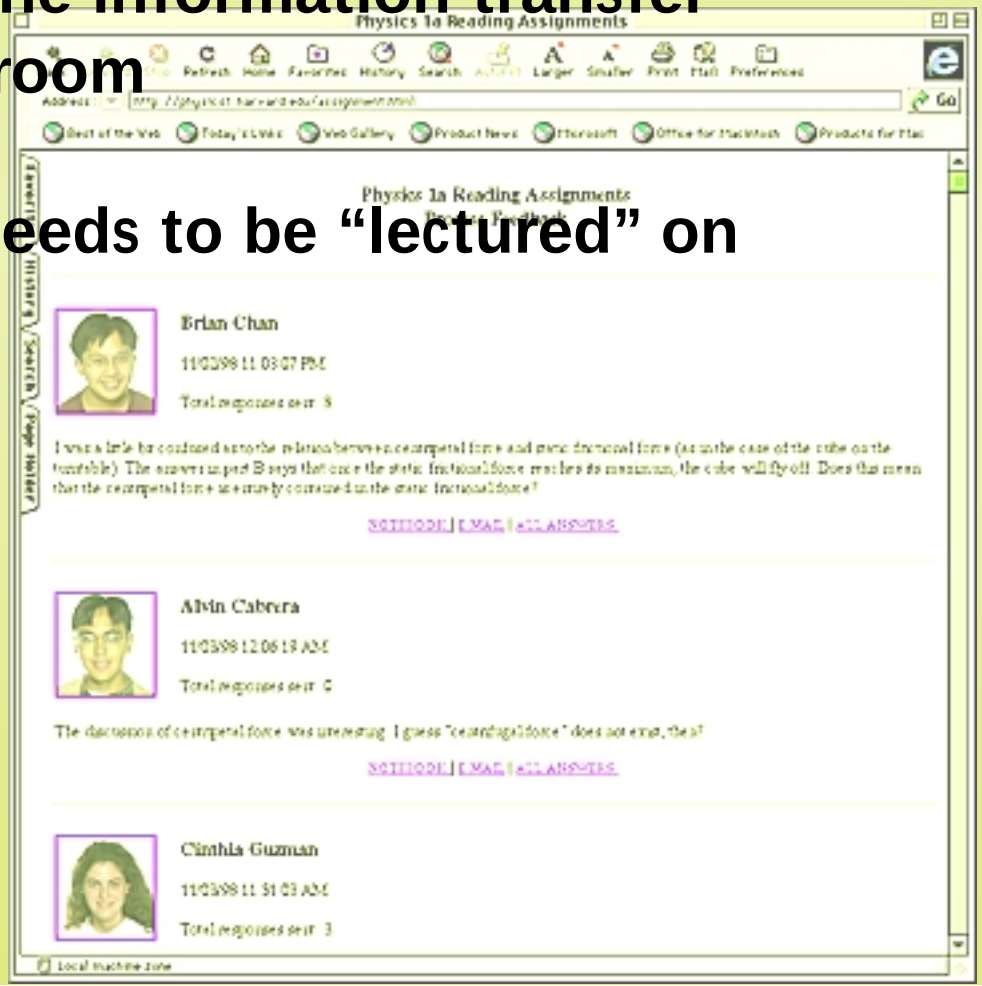
What problems can technology help with?

Large lectures…

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

Just-in-time teaching

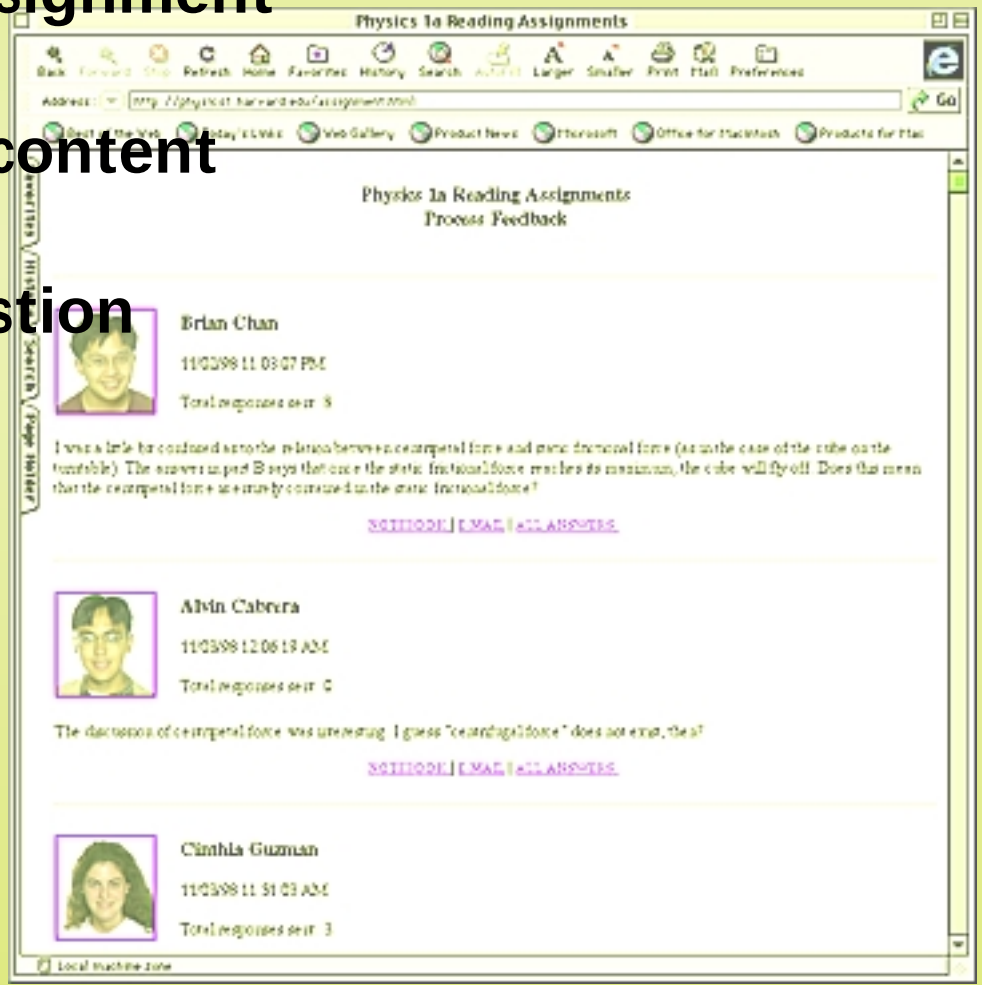
- move some of the information transfer out of the classroom
- find out what needs to be “lectured” on



Just-in-time teaching

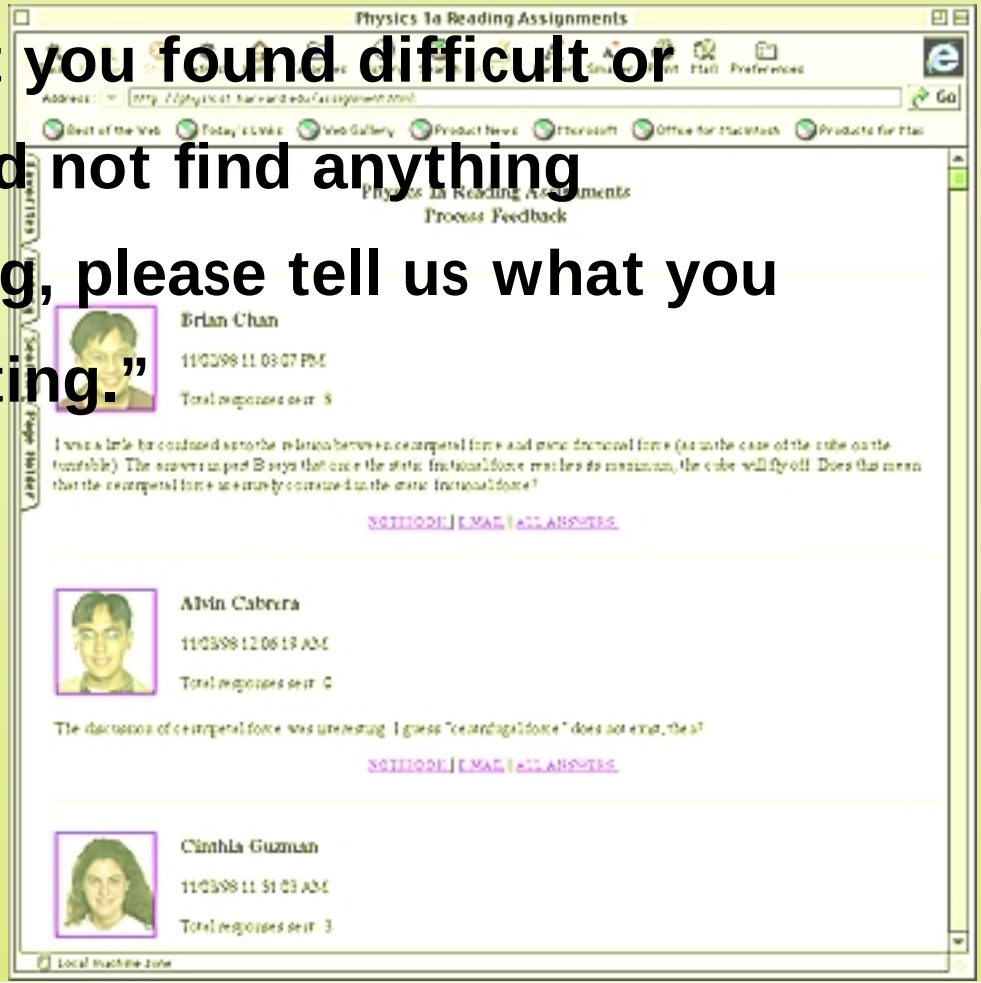
Pre-class reading assignment

- **2 questions on content**
- **1 feedback question**

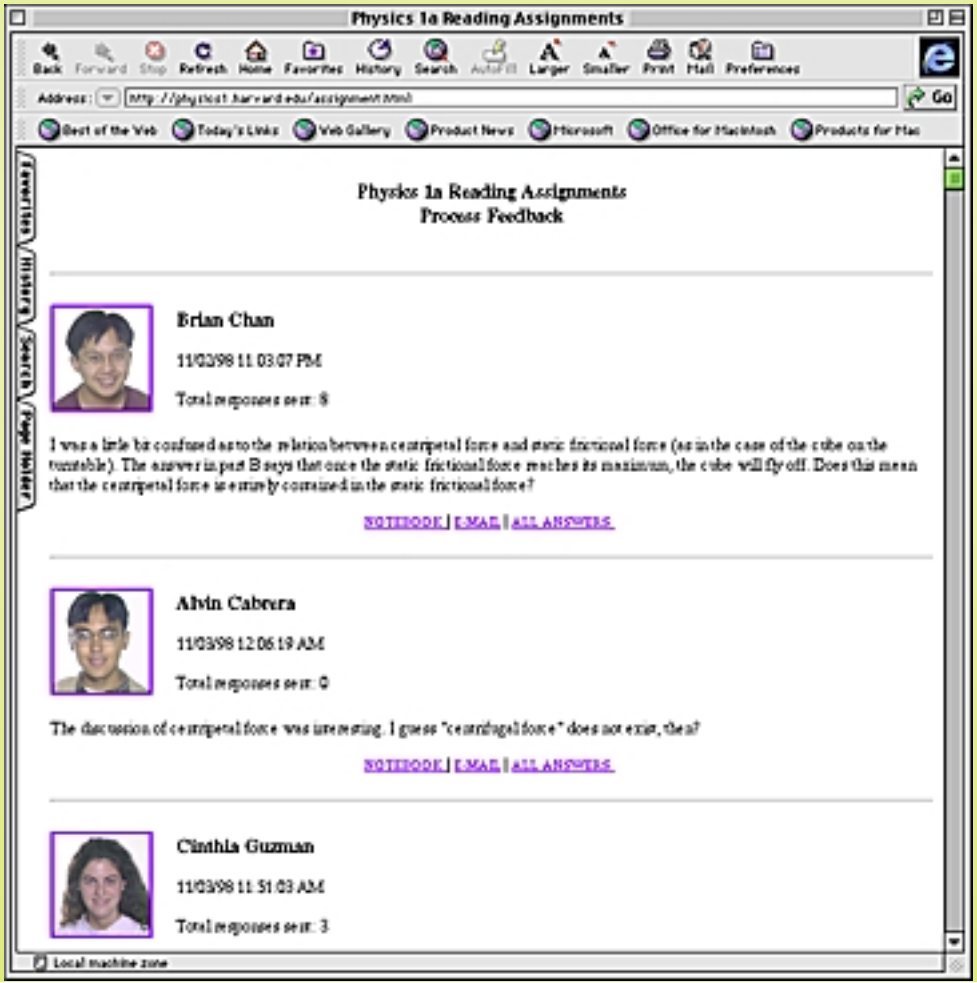


Just-in-time teaching

“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.”



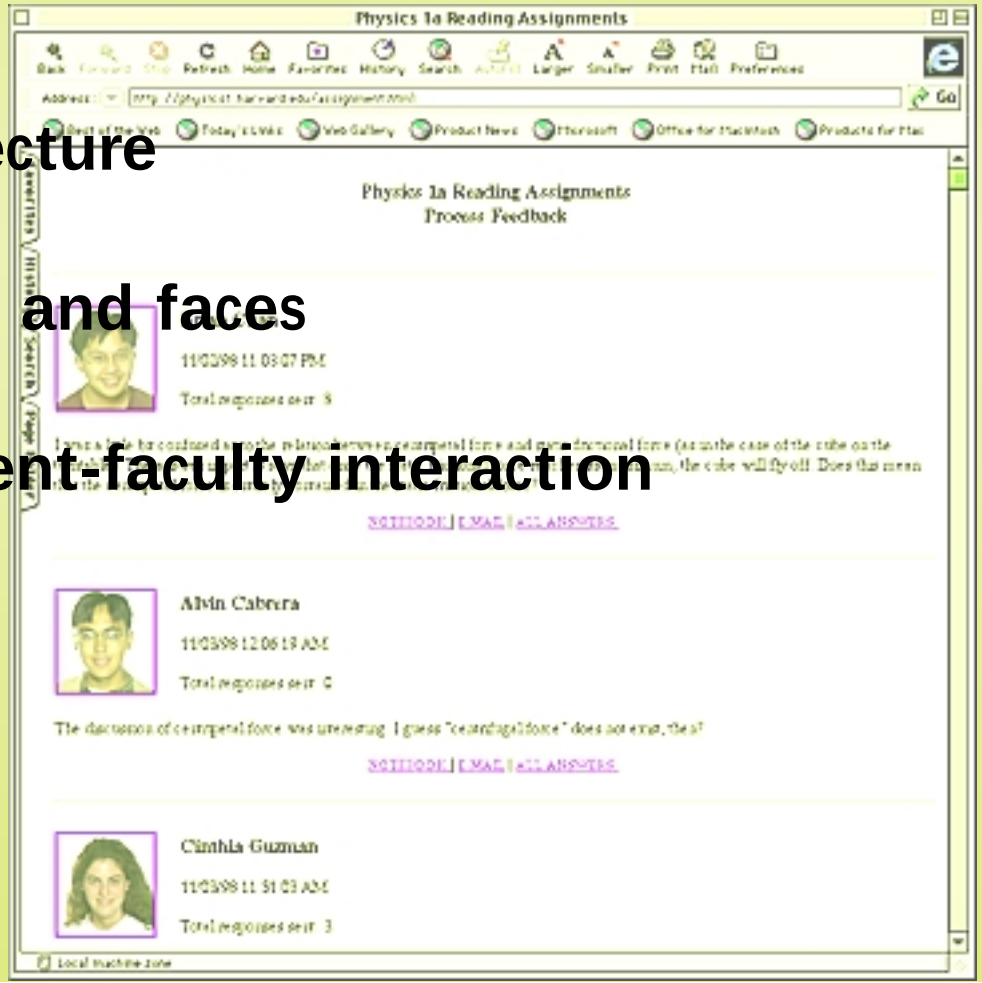
Just-in-time teaching



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

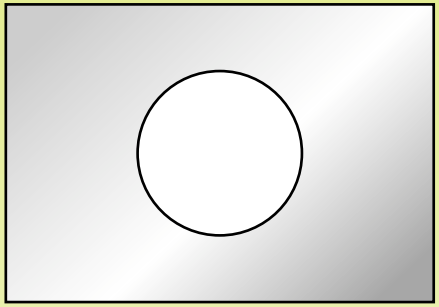
1. aim tip at nearest receiver

2. press button corresponding to answer

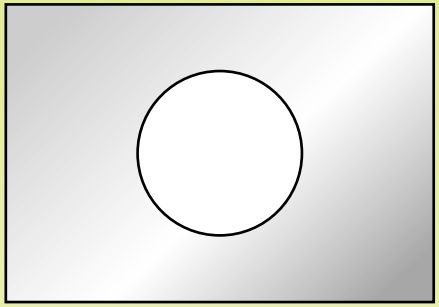
3. watch for ID on screen

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

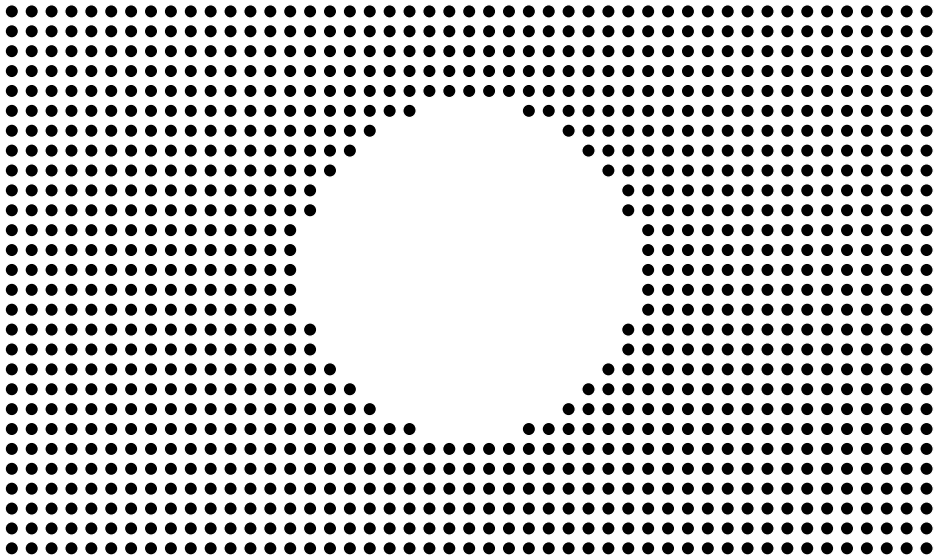
1. increases

2. stays the same

3. decreases

Personal response system

Just so you won’t lose sleep:



Personal response system

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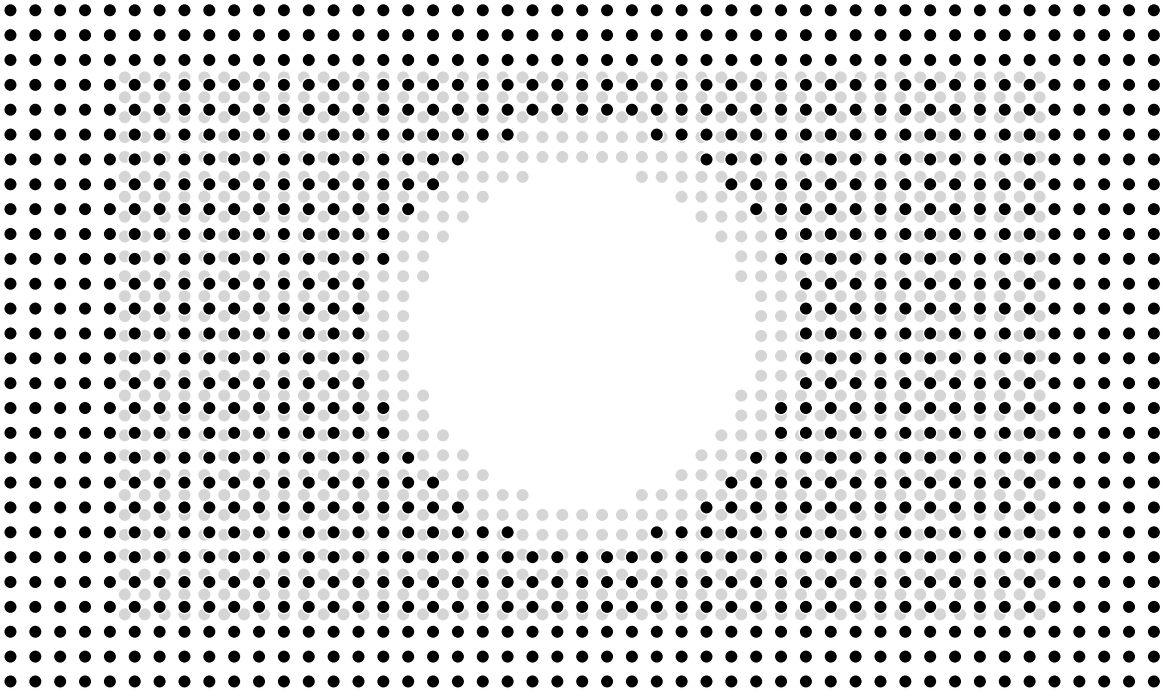

Personal response system

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
Prentice Hall
Varitronix

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

http://mazur-www.harvard.edu