Improving education through research





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If you were to give your students a reading assignment before your next class, what fraction of your students would complete it?

If you were to give your students a reading assignment before your next class, what fraction of your students would complete it?

- 1. (nearly) all of them
- 2. about three quarters
- 3. about half
- 4. about one quarter
- 5. not many

WHY?

Why read if most lectures

focus on information transfer?

education = information transfer?

1. information transfer

1. information transfer

2. assimilation of information

1. information transfer (easy)

2. assimilation of information (hard and left to student)



move information transfer out of classroom!



move information transfer out of classroom!

(so we can help students assimilate the information in class)



"Confessions of a converted lecturer"



Eric Mazur: "I thought I was a good teacher until I discovered my students

162 likes, 1 dislikes

Outline

20



Outline

Peer Instruction

Let's try it!

Discussion

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ERIC MAZUR



teach by questioning

brief presentation























data collected in a range of disciplines shows:

- significant gains in conceptual knowledge
- larger retention of knowledge
- lower drop-out rate in courses and majors
- decrease in gender gap in academic performance

Outline

Peer Instruction

• Let's try it!

Discussion



projectile trajectories



drop a quarter from a certain height



drop a quarter from a certain height

how does the time to fall depend on the height?



throw a quarter vertically up



throw a quarter vertically up

how does time to rise compare to time to fall?



greater height = greater time to fall

motion up = inverse of motion down



greater height = greater time to fall

motion up = inverse of motion down

horizontal/vertical motion decoupled

Let's try it!

You simultaneously throw two coins. If the coins follow the parabolic trajectories shown below, which coin hits the ground first?



Let's try it!

You simultaneously throw two coins. If the coins follow the parabolic trajectories shown below, which coin hits the ground first?



- **1.** A
- 2. both at (nearly) the same time
- 3. B
- 4. need more information





It's easy to fire up the audience!



time each coin spends in air



time each coin spends in air

 $2t_{\rm h}$

(twice time to fall from maximum height)

Let's try it!

You simultaneously throw two coins. If the coins follow the parabolic trajectories shown below, which coin hits the ground first?



A
both at (nearly) the same time
B
A
A need more information



Research Funding:

Pew Charitable Trust, Pearson/Prentice Hall, Davis Foundation, Engineering Information Foundation, Derek Bok Center for Teaching and Learning, National Science Foundation

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