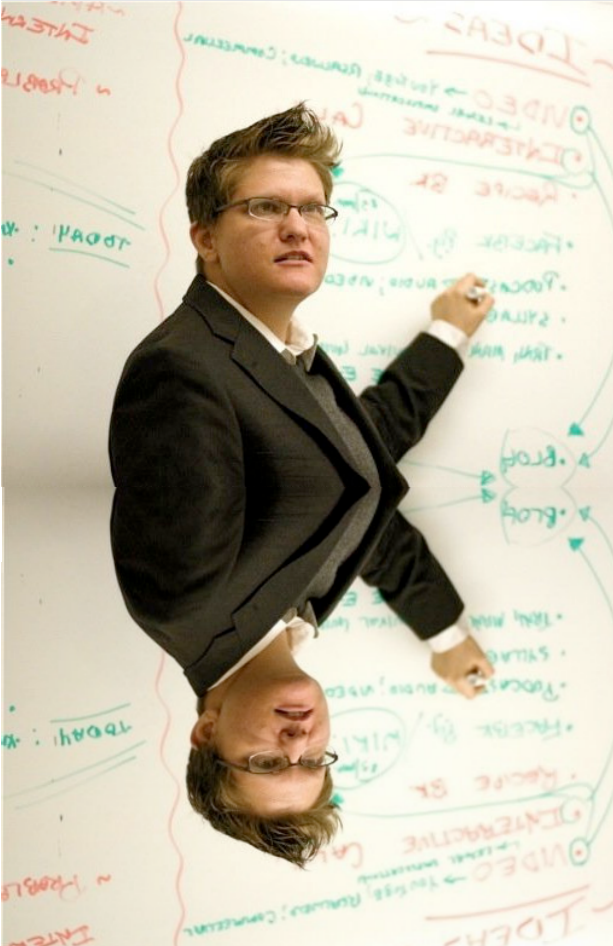


# Flipping the STEM Classroom: How to turn your students' world upside down.



**Julie Schell** is your host for the first IDIA Fall 2012 Webinar Series. Dr. Schell is the senior research associate for educational research in the Mazur Group at Harvard University, School of Engineering and Applied Sciences, where she studies flipped classrooms. She is the author of *Turn To Your Neighbor*, a blog about flipping your classroom with research-based pedagogies. Follow Julie on Twitter: @julieschell



[blog.peerinstruction.net](http://blog.peerinstruction.net)



[mazur.harvard.edu](http://mazur.harvard.edu)  
[scholar.harvard.edu/julieschell](http://scholar.harvard.edu/julieschell)



---

Think of something that you are good at, preferably something that has helped you in your career.

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In a few words, how did you get good at that skill?

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In a few words, how did you get good at that skill?

- A. Listening to lecture
- B. Practicing (Trial and Error)
- C. Apprenticeship
- D. Something else

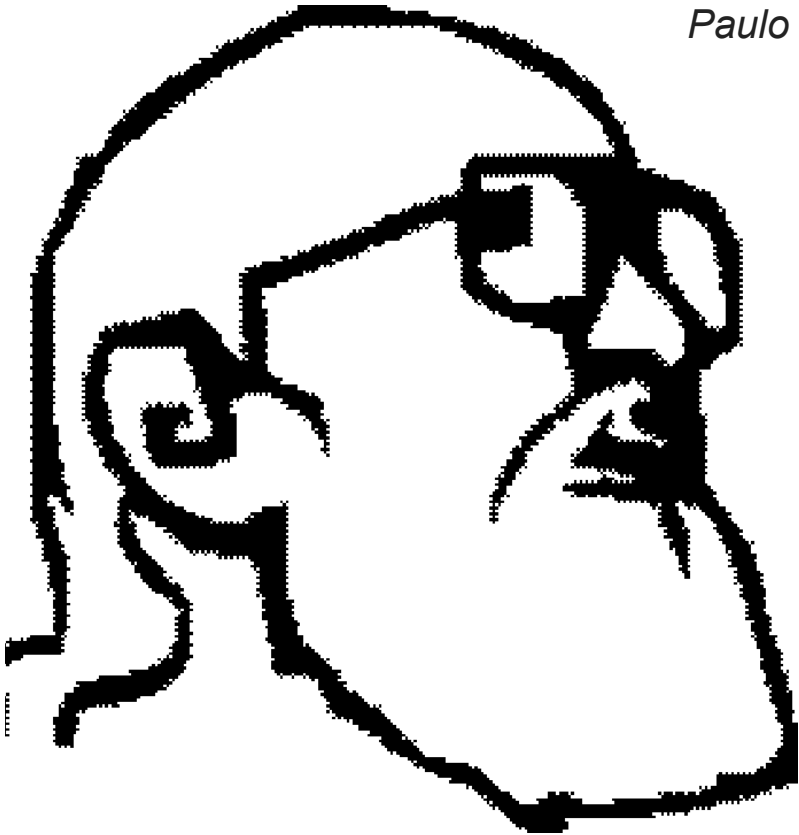
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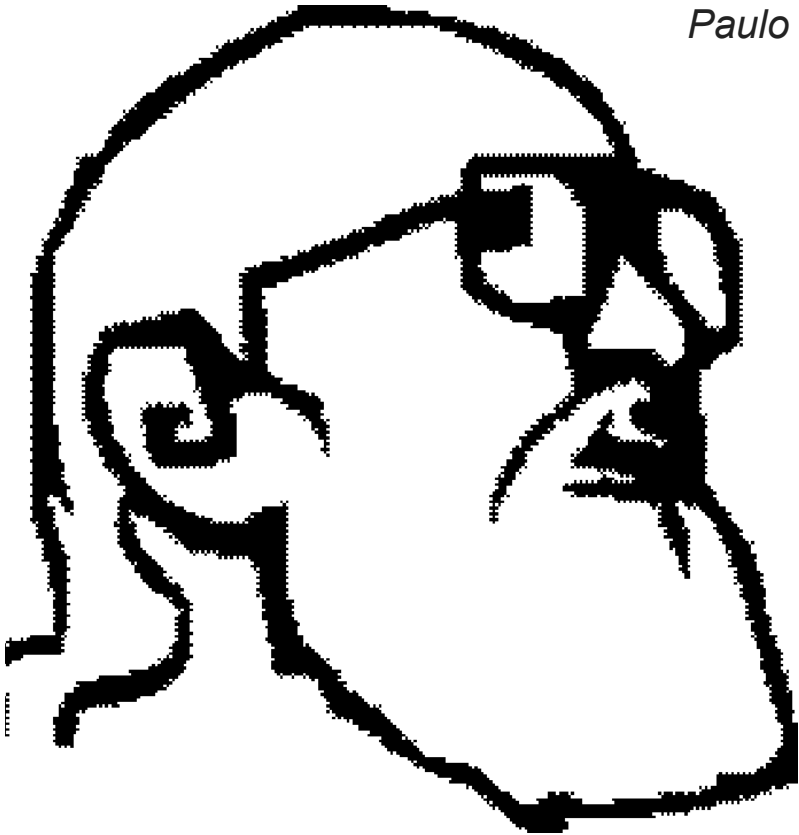
***Problem:*** Education is suffering from narration sickness.

*Paulo Freire, 1970*



***Solution:*** Limit passivity, boost engagement.

*Paulo Freire, 1970*



# Goals

## Salon Invertido

**After this webinar you will be able to...**

- 1. Define the Flipped Classroom method**



# Goals

## Salon Invertido

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- 2. Identify ways to boost out-of-class engagement**

# Goals

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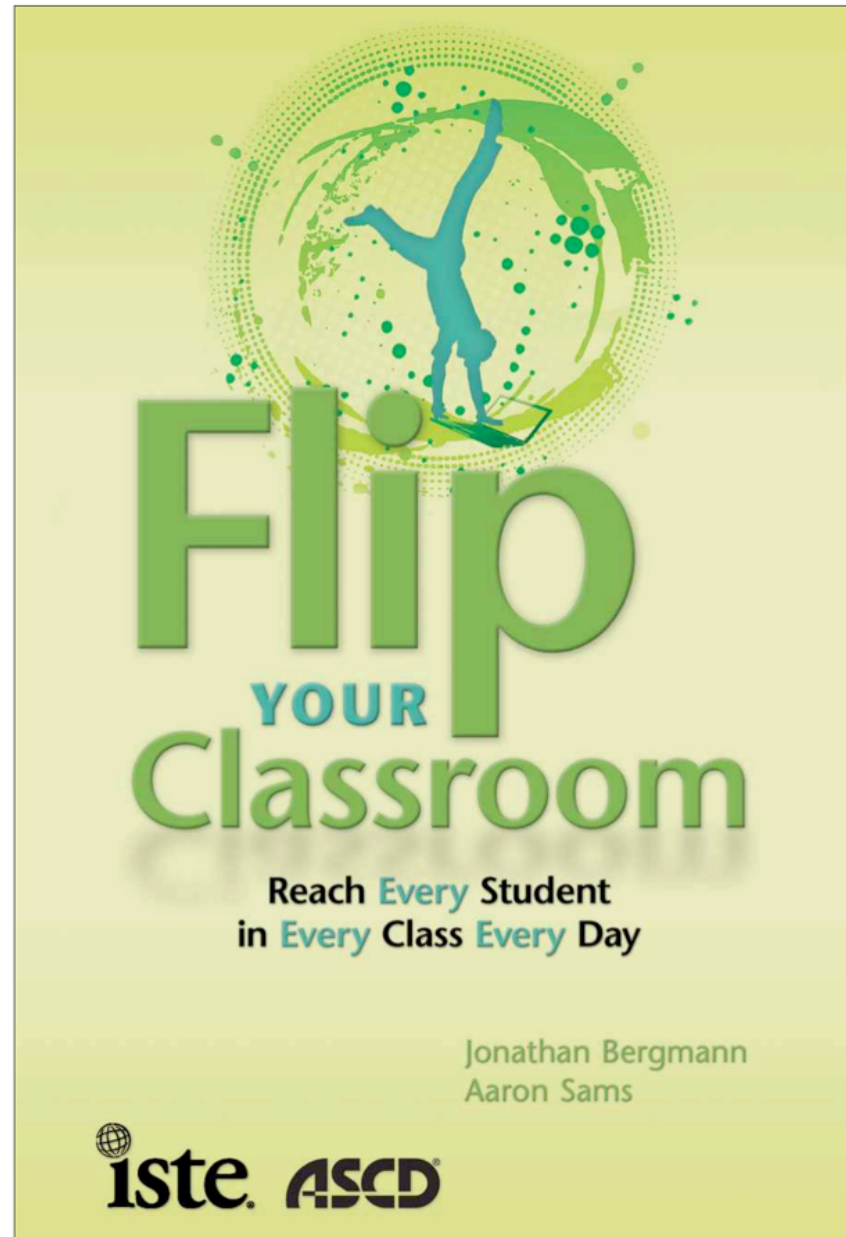
## Salon Invertido

**After this webinar you will be able to...**

- 1. Define the Flipped Classroom method**
- 2. Identify ways to boost out-of-class engagement**
- 3. Identify ways to boost in-class engagement**
- 4. Access resources for learning more about flipping your classroom**

# **1 What is the Flipped Classroom?**

# What is a Flipped Classroom?



# What is a Flipped Classroom?

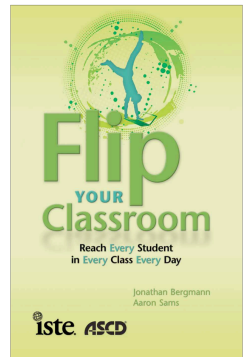
**“Flipping the classroom is...[a] mindset: redirecting attention away from the teacher and putting attention on the learner and the learning.”**

Bergmann and Sams p. 12

# What is a Flipped Classroom?

## One Conception of the Flipped Classroom Lineage

FLIP YOUR CLASSROOM: REACH EVERY STUDENT IN EVERY CLASS EVERY...



Bergmann and  
Sams  
2006-2007

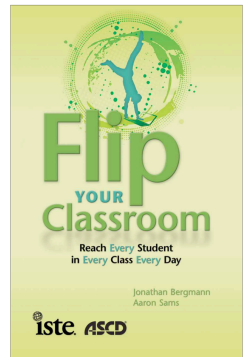
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Eric Mazur  
1990s



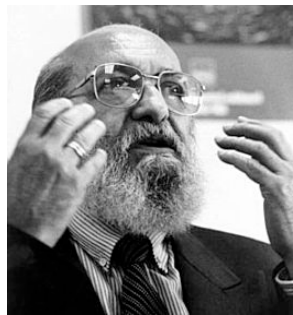
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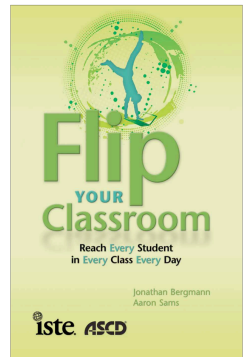
FLIP YOUR CLASSROOM: REACH EVERY STUDENT IN EVERY CLASS EVERY...



Paulo Freire  
1970s



Eric Mazur  
Gregor Novack  
1990s



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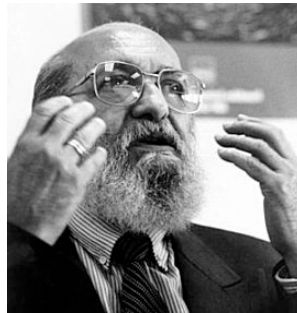
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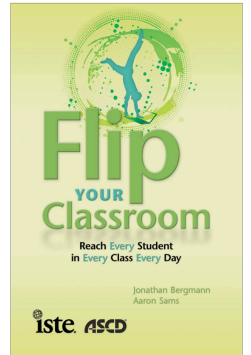
Langdell  
1870s



Paulo Freire  
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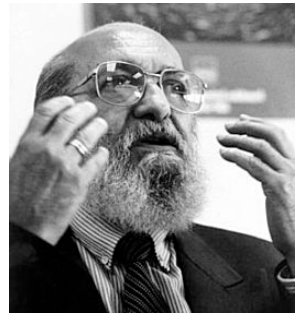
FLIP YOUR CLASSROOM. REACH EVERY STUDENT IN EVERY CLASS EVERY...



Socrates  
BC 469



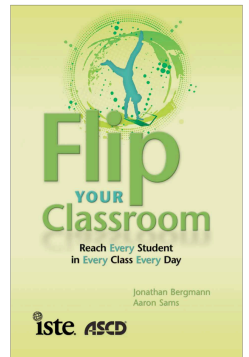
Langdell  
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Paulo Freire  
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Eric Mazur  
Gregor Novack  
1990s



Bergmann and  
Sams  
2006-2007

# What is a Flipped Classroom?

## Traditional Flipped Class

Bergmann and Sams

**Traditional Class**

-

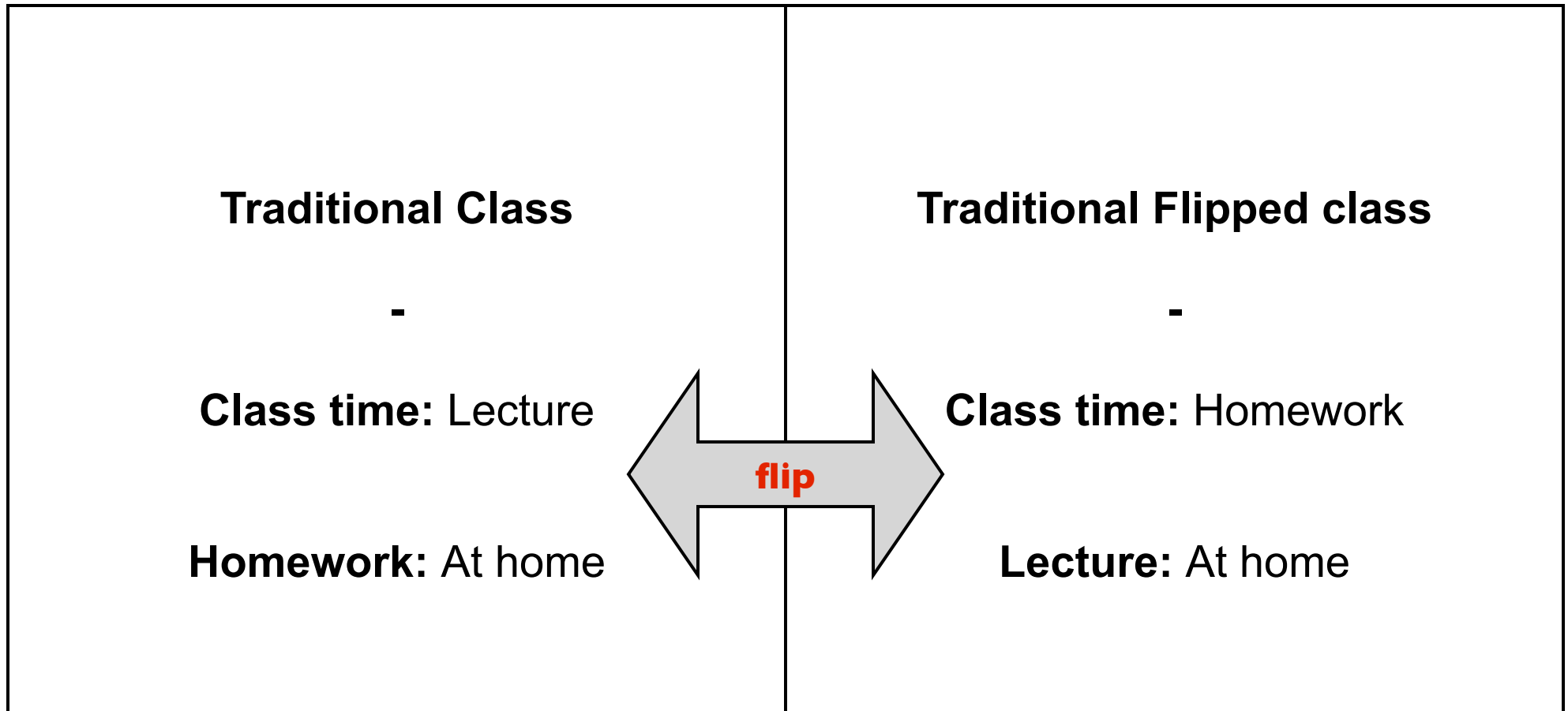
**Class time:** Lecture

**Homework:** At home

# What is a Flipped Classroom?

## Traditional Flipped Class

Bergmann and Sams



# What is a Flipped Classroom?

## Traditional Flipped Class Protocol

Bergmann and Sams version

1. Video record lecture using screencast software

# What is a Flipped Classroom?

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## Traditional Flipped Class Protocol

Bergmann and Sams version

1. Video record lecture using screencast software
2. Put lecture online and require students to watch the lecture, give them some instruction on how to watch the videos effectively
3. Spend 10 mins during class time talking about the video



# What is a Flipped Classroom?

## Traditional Flipped Class Protocol

Bergmann and Sams version

1. Video record lecture using screencast software
2. Put lecture online and require students to watch the lecture, give them some instruction on how to watch the videos effectively
3. Spend 10 mins during class time talking about the video
4. Do traditional “homework” during class, where you can help students work out issues

# What is a Flipped Classroom?

Traditional Classroom		Traditional Flipped Classroom	
Activity	Time	Activity	Time
Admin	5 min	Admin	5 min
Questions?	10 mins	Questions on video	10 mins
Lecture on new content	30-45 mins	Guided & independent practice	30-45 mins

# What is a Flipped Classroom?

Traditional Classroom		Traditional Flip	
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Bergmann and Sams  
use Flipped Classroom  
Mastery Model now

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Customize to fit your own style

---

Flipped classrooms move **passive narration** out  
and **active engagement** in to the classroom

---

Some physicists who try limiting lecture and boosting engagement, go back to the traditional method.\*

Why?

- A. Time
- B. Student Resistance
- C. Lack of sustained support
- D. Something else

- 1 What is the Flipped Classroom?**
- 2 Boosting out-of-class engagement**

# Boosting out-of-class engagement

## **Just-in-Time Teaching**

online, pre-class assignments with feedback questions



# Boosting out-of-class engagement

## **Just-in-Time Teaching**

online, pre-class assignments with feedback questions

- 2 conceptual questions about a key concept
- 1 feedback question - what did you find most interesting or confusing about what you read

# Boosting out-of-class engagement

## Just-in-Time Teaching

online, pre-class assignments with

- 2 conceptual questions about a
- 1 feedback question - what did you find most interesting or confusing about what you read

**Hack:**  
Have students answer the feedback question on a piece of paper during the first 10 mins of class, collect review quickly

# Boosting out-of-class engagement

**nb**

online text annotation tool

- Students, faculty, course staff use nb to engage with content and each other

# Tools

<http://nb.mit.edu>

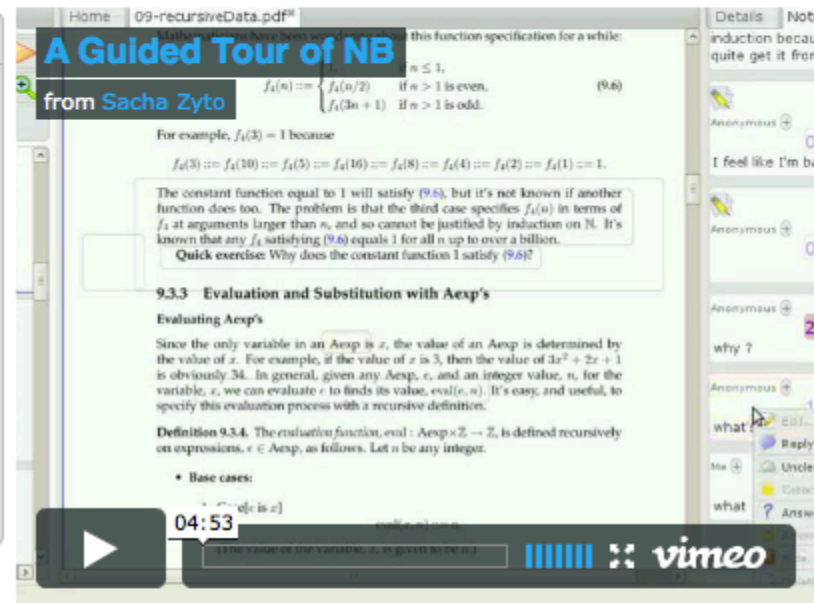


[About](#) [New:NB@CHI2012](#) [Tutorial](#) [Contact Us](#)

## Features

With **nb**, you can annotate course material online, either for yourself, or to discuss it with the class.

- Did you notice something interesting ?  
*Jot a note for others to read...*
- Do you have a question ?  
*Jot it down to get an answer...*
- Did you see a question you can answer ?  
*Right-click on it to post an answer...*
- Do you like or dislike a note ?  
*Moderate it up or down...*



## For Teaching Staff

- [See how](#) you can benefit from **nb**.
- [Create a new nb site now](#)
- Take a 5-minute [tutorial](#)
- Already a user ? Access your [Staff Console](#)

## Give it a try now



Material courtesy: [Professor Albert Meyer](#)  
Notes in the sandbox may be discarded.

## Login













Email

Password













[Lost password ?](#)

OK

# Boosting out-of-class engagement

Name ↕	Assignment#	Download PDF	Stats		
 <a href="#">ch22</a>	No	<a href="#">original</a>	me <u>1</u>	unread <u>39</u>	all <u>50</u>
 <a href="#">ch32</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>73</u>	all <u>73</u>
 <a href="#">ch25</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>131</u>	all <u>131</u>
 <a href="#">ch33</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>99</u>	all <u>99</u>
 <a href="#">ch26</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>96</u>	all <u>99</u>
 <a href="#">ch24</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>169</u>	all <u>180</u>
 <a href="#">Ch30</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>81</u>	all <u>81</u>
 <a href="#">ch29</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>38</u>	all <u>38</u>
 <a href="#">ch27</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>53</u>	all <u>55</u>
 <a href="#">ch23</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>154</u>	all <u>172</u>
 <a href="#">ch28</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>79</u>	all <u>79</u>
 <a href="#">ch31</a>	No	<a href="#">original</a>	me <u>0</u>	unread <u>41</u>	all <u>41</u>

# Boosting out-of-class engagement

Name ↕	Assignment#	Download PDF	Stats
 ch22	No	<a href="#">original</a>	me <u>1</u> unread
 ch32	No	<a href="#">original</a>	me <u>0</u> unread
 ch25	No	<a href="#">original</a>	me <u>0</u> unread
 ch33	No	<a href="#">original</a>	me <u>0</u> unread
 ch26	No	<a href="#">original</a>	me <u>0</u> unread <u>96</u> all
 ch24	No	<a href="#">original</a>	me <u>0</u> unread <u>169</u> all <u>180</u>
 Ch30	No	<a href="#">original</a>	me <u>0</u> unread <u>81</u> all <u>81</u>
 ch29	No	<a href="#">original</a>	me <u>0</u> unread <u>38</u> all <u>38</u>
 ch27	No	<a href="#">original</a>	me <u>0</u> unread <u>53</u> all <u>55</u>
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 ch28	No	<a href="#">original</a>	me <u>0</u> unread <u>79</u> all <u>79</u>
 ch31	No	<a href="#">original</a>	me <u>0</u> unread <u>41</u> all <u>41</u>

Hack:  
Google Docs, google  
“annotation tools”  
or  
Have students annotate hard  
copy night before then pass  
pdf to neighbor to comment

# Boosting out-of-class engagement

## **PeerWise**

social network for creating and evaluation questions

- Students use PeerWise to create questions, explain their understanding, and interact with peers and faculty around content

# Boosting out-of-class engagement

<http://peerwise.cs.auckland.ac.nz>



Get started!

## Welcome to PeerWise

To log in, select your school / institution from the list below

  
*Just type the first few characters...* 

**PeerWise** supports students in the creation, sharing, evaluation and discussion of assessment questions.



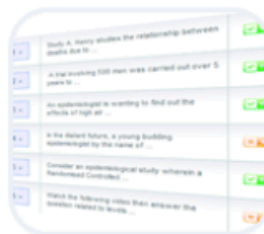
### What is PeerWise?

Students use PeerWise to create and to explain their understanding of course related assessment questions, and to answer and discuss questions created by their peers.



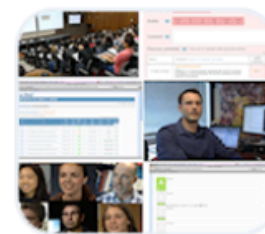
### Any subject

PeerWise is used in a wide range of subjects, including Anthropology, Biology, Chemistry, Computer Science, Physics, Population Health, Pharmacology, Medicine, and many more...



### Free and easy to use

PeerWise is free and very easy to use. Students are presented with a simple, intuitive interface and instructors can easily view student content and monitor participation.



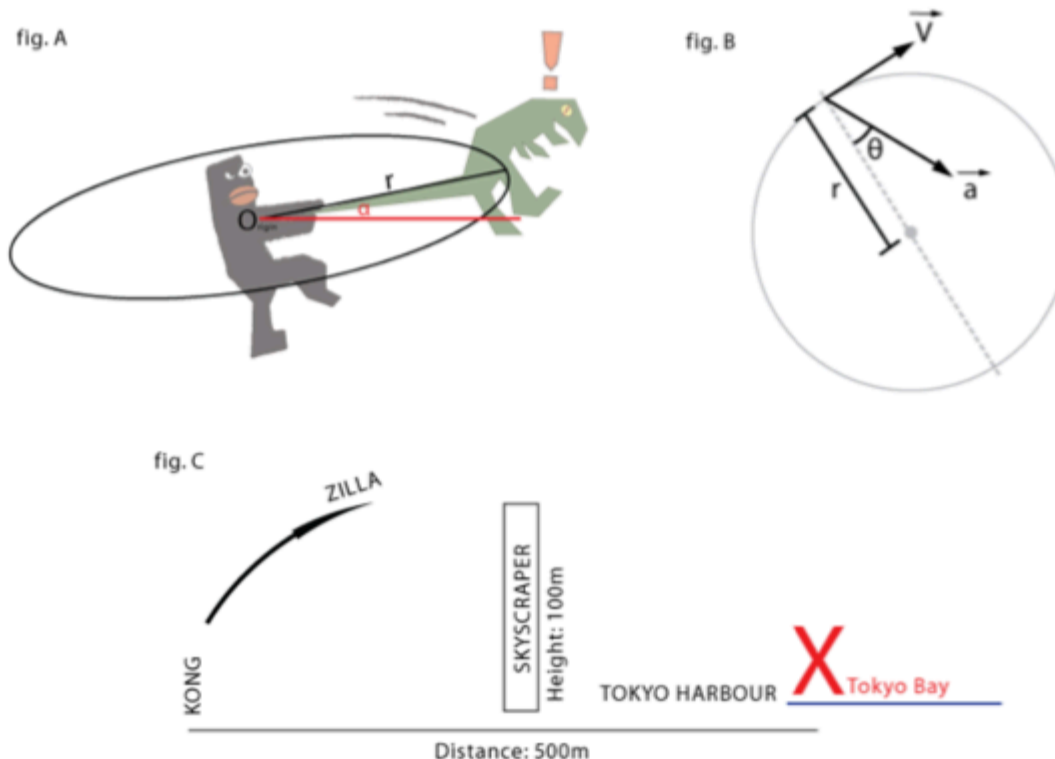
### Find out more

Want to get started? View student and instructor guides, watch screencasts of PeerWise in action, and hear what students and instructors think in the [Information about PeerWise](#) section.



# Boosting out-of-class engagement

<http://peerwise.cs.auckland.ac.nz>



King Kong and Godzilla are slugging it out in downtown Tokyo, as they are prone to do on quiet Sunday evenings. Kong quickly gains the upper hand and catches Godzilla by the tail, spinning him in a tilted circle of  $r$  meters. In a clockwise direction, at an angle of  $\alpha$  degrees to the horizontal. What happens to Godzilla?

# Boosting out-of-class engagement

<http://peerwise.cs.auckland.ac.nz>

fig. A

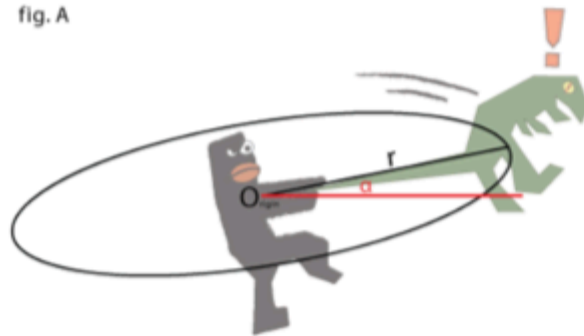


fig. B

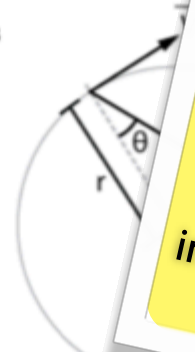
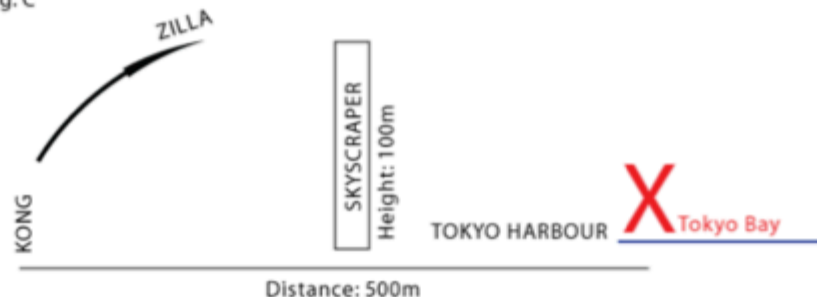


fig. C



Hack:  
Use Google Docs  
or  
Have students write questions  
on hard copy paper and hand  
in during class, write a few  
interesting questions on board

King Kong and Godzilla are slugging it out in downtown Tokyo, as they are prone to do on quiet Sunday evenings. Kong quickly gains the upper hand and catches Godzilla by the tail, spinning him in a tilted circle of  $r$  meters. In a clockwise direction, at an angle of  $\alpha$  degrees to the horizontal. What happens to Godzilla?

- 1 What is the Flipped Classroom?**
- 2 Boosting out-of-class engagement**
- 3 Boosting in-class engagement**

# Boosting out-of-class engagement

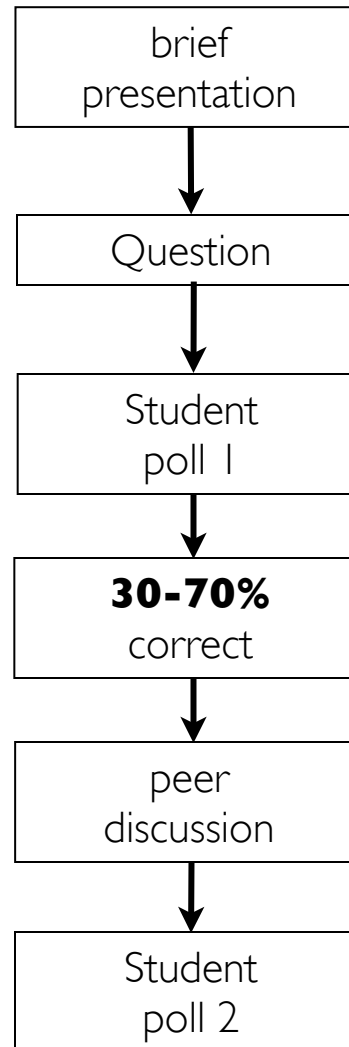
## **Peer Instruction**

research-based, interactive teaching method

- Students engage in a series of activities prompted by short, conceptual questions meant to elicit, confront, and resolve misconceptions.

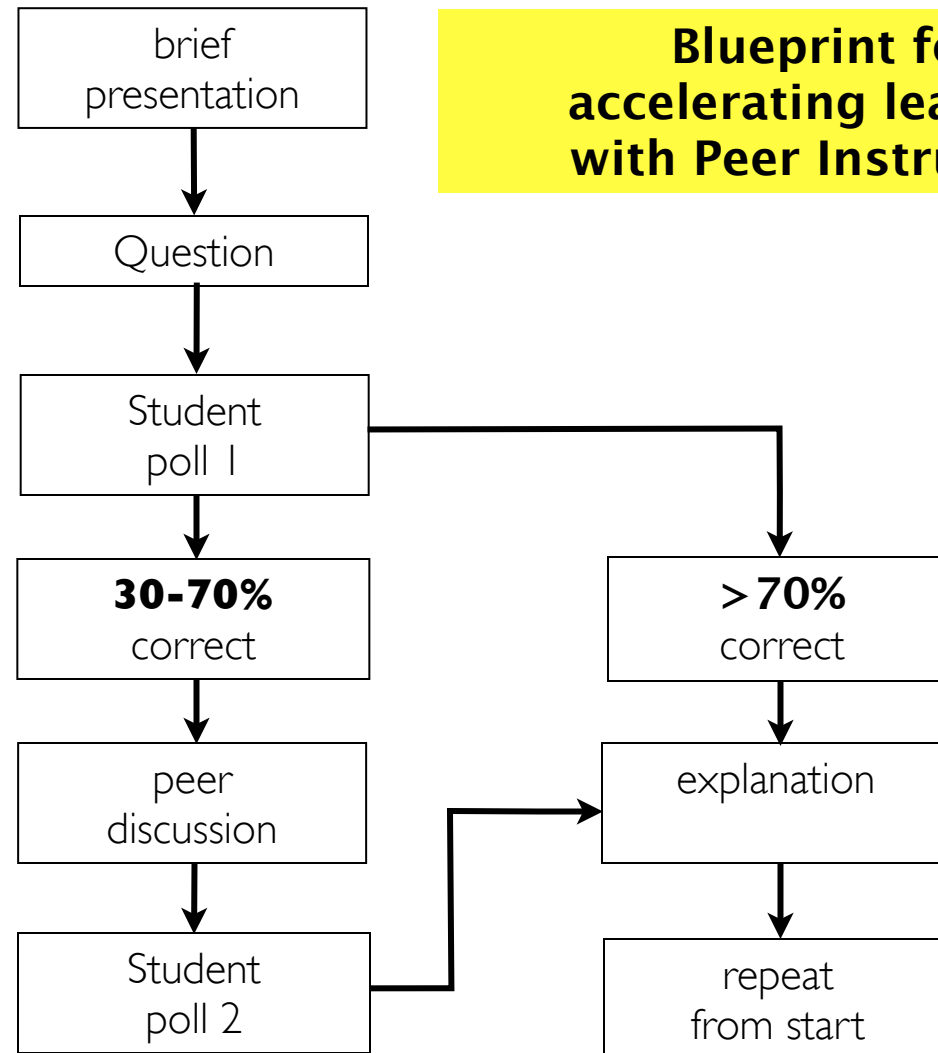
# Boosting in-class engagement

**Blueprint for  
accelerating learning  
with Peer Instruction**



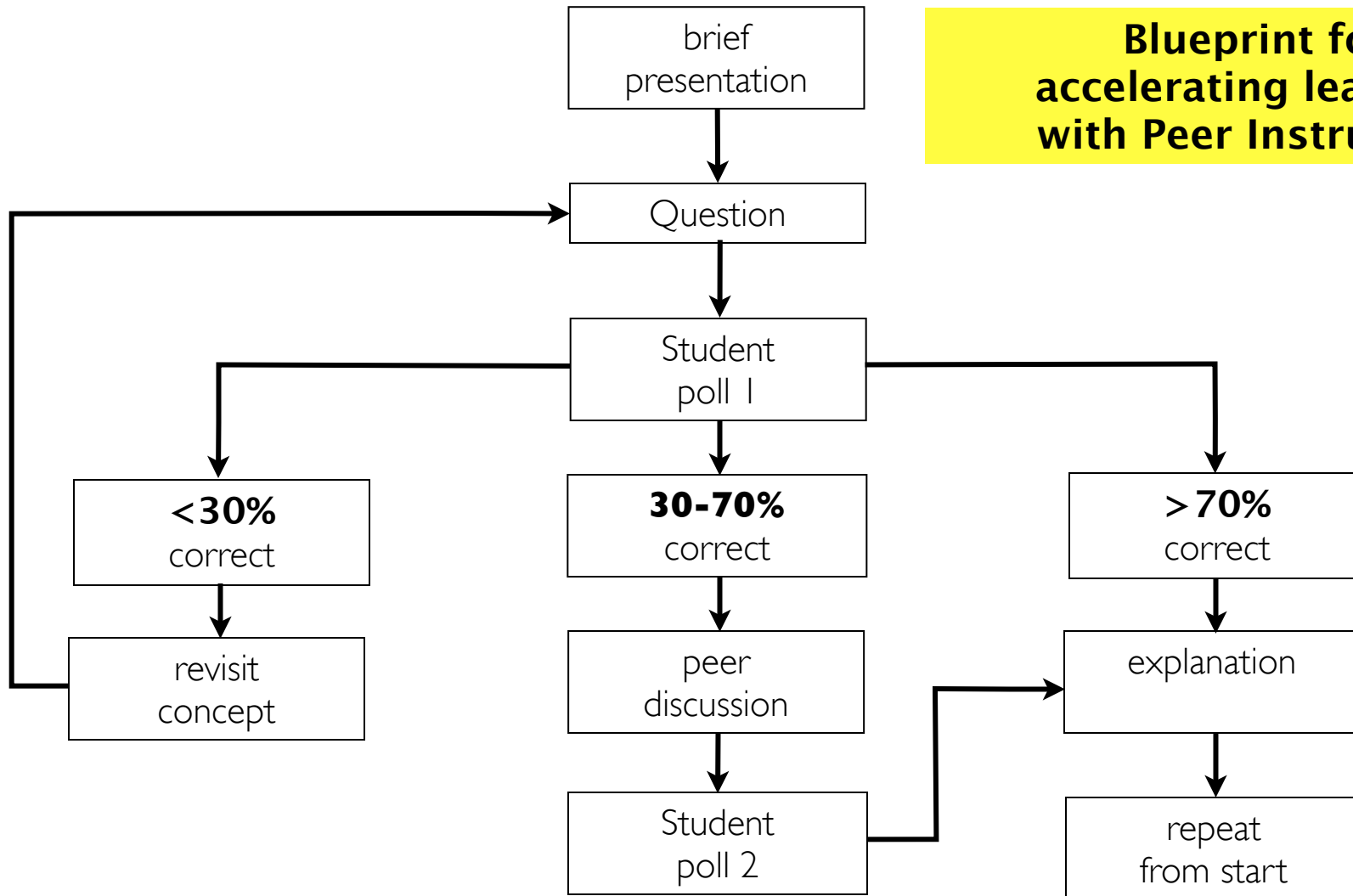
# Boosting in-class engagement

## Blueprint for accelerating learning with Peer Instruction



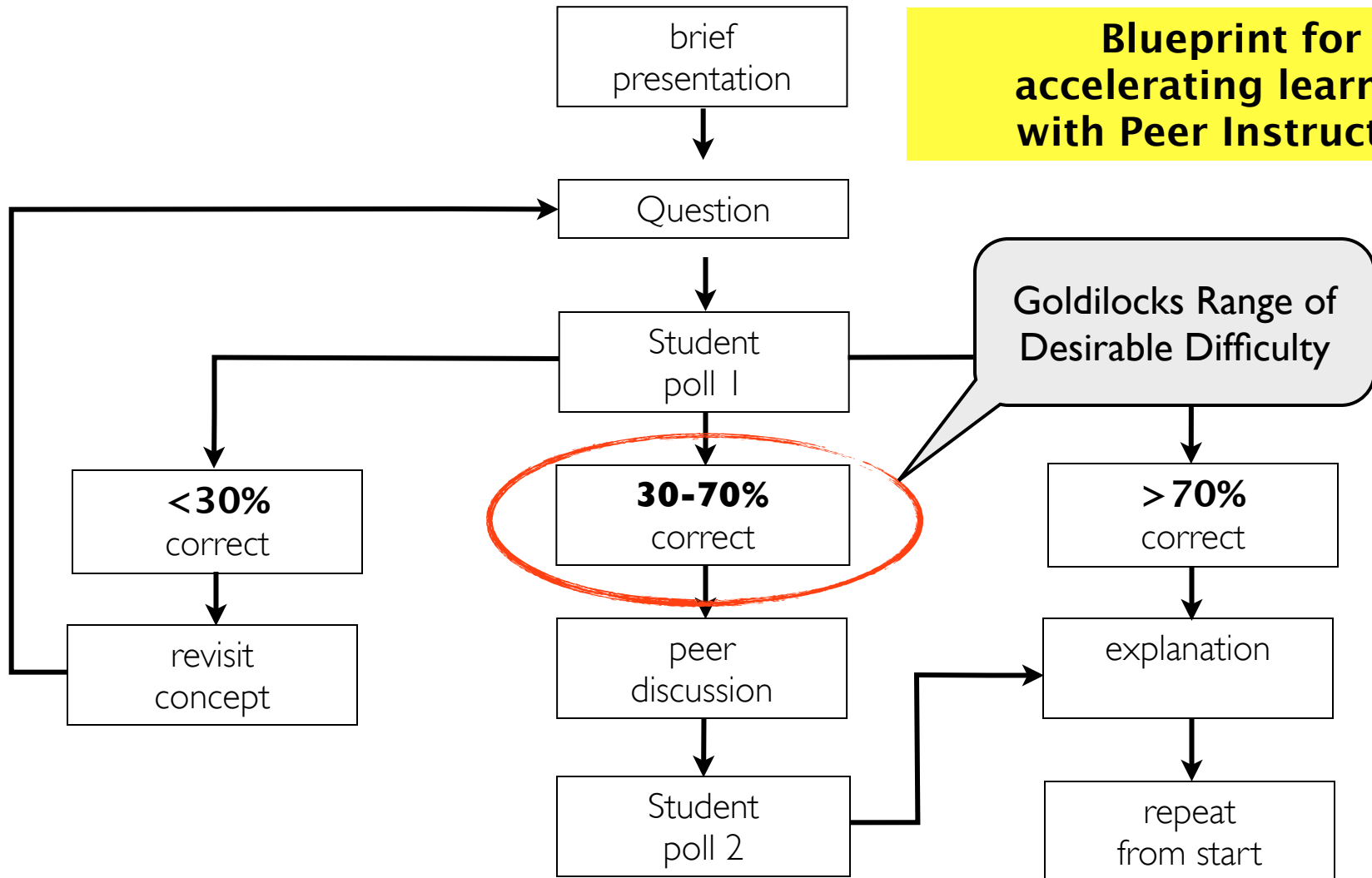
# Boosting in-class engagement

## Blueprint for accelerating learning with Peer Instruction



# Boosting in-class engagement

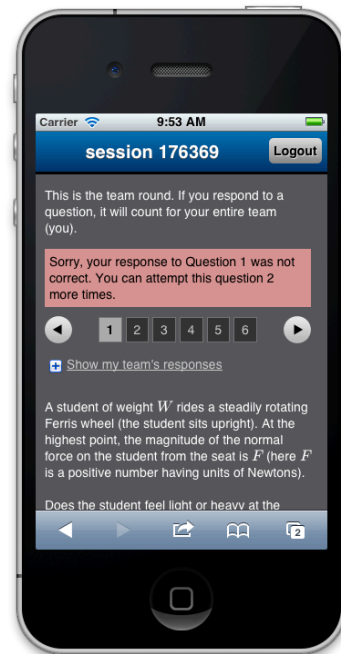
## Blueprint for accelerating learning with Peer Instruction





# Boosting in-class engagement

## Other tools for facilitating Peer Instruction



# Boosting in-class engagement



## **Hack:**

Have students vote by holding up flashcards or fingers (1234) to vote or use a chalk board

# Boosting in-class engagement



How will you flip your classroom?

A. Just-in-Time Teaching

B. NB

C. PeerWise

D. Peer Instruction

E. More than one

F. Something else

- 1 What is the Flipped Classroom?**
- 2 Boosting out-of-class engagement**
- 3 Boosting in-class engagement**
- 4. Resources for Flipping**

A stylized illustration of a person in a blue silhouette performing a handstand on a green book. The person is surrounded by green dots and a circular pattern of dots, suggesting motion or a globe.

# Flip YOUR Classroom

Reach **Every** Student  
in **Every** Class **Every** Day

Jonathan Bergmann  
Aaron Sams

 **iste.** **ASCD**<sup>®</sup>

[www.peerinstruction.net](http://www.peerinstruction.net)

# Peer Instruction Network

CONNECT. SHARE. LEARN.

## Join

The Peer Instruction Network connects innovative educators from across the globe.



Not a member? [Sign up now!](#)

## Sign in

Email

Password

[Forgot Password?](#)

☐ Remember me

**Sign in**

[What is PeerInstruction.net?](#)



# blog.peerinstruction.net

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## About Peer Instruction Network



### Peer Instruction Network

Peer Instruction Network is the global community for current and future users of Peer Instruction and related interactive teaching methods. By joining, you can **Connect** with other innovative educators, **Share** experiences and resources, and **Learn** how to transform teaching and learning using research-based methods.

### Peer Instruction

Peer Instruction is a research-based, interactive teaching method developed by [Eric Mazur](#) at [Harvard University](#) in the 1990s. It has been adopted across the disciplines, institutional types, and throughout the world. To learn more about Peer Instruction, check out our blog at [Turn to Your Neighbor](#) and download papers and talks about Peer Instruction on [Mazur's website](#).

### Peer Instruction Network Team

Peer Instruction Network was founded and directed by [Julie Schell](#), senior postdoctoral fellow in the [Mazur Group](#), in the [School of Engineering and Applied Sciences at Harvard University](#) and [Eric Mazur](#), the developer of Peer Instruction and the Balkanski Professor of Physics and Applied Physics at [Harvard University](#) and Area Dean of Applied Physics. Follow them on twitter at [@julieschell](#) and [@eric\\_mazur](#)

[Peer Instruction Network Terms of Use and Privacy Policy](#)

# learn



## Turn to Your Neighbor

The Official Peer Instruction Blog

Home

### Confession

June 5, 2012 · Best Practices, Clicker questions, Flipped classroom, Implementation, Interactive Teaching, Large Class Sizes, Peer Instruction

Print Post

#### Authors

Julie Schell

This week we have Alvarado. Turn to Your Neighbor. Dr. Alvarado this semester at Texas at Austin using

I am writing to make

What business do I have in this blog post, I'm not a peer instructor. Then again, Turn to Your Neighbor method.

## Turn to Your Neighbor

The Official Peer Instruction Blog

Home

### Peer Instruction Advanced With iClicker

May 11, 2012 · Best Practices, Clicker questions, Flipped classroom, Implementation, Interactive Teaching, Large Class Sizes, Peer Instruction

Print Post

#### Authors

Julie Schell

As I have been wondering whether Peer Instruction is worth the effort, Hank, who is a peer instructor, and Rich who is a peer instructor

## Turn to Your Neighbor

The Official Peer Instruction Blog



Home

### Can you flip large classes?

April 6, 2012 · Best Practices, Clicker questions, Flipped classroom, Implementation, Interactive Teaching, Large Class Sizes, Peer Instruction

Print Post

Email

Tweet

#### Authors

Julie Schell

PeerInstruction.net Members  
Want to Know





## Search for People on the PI Network

Displaying all 23 profiles

[Export this Search](#)

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<a href="#">Cassandra Alvarado</a> cassandra.alvarado@aus...	Austin, TX United States	The University of Texas at Austin	Education, General
<a href="#">Roger Bengtson</a> bengtson@physics.utexa...	Austin, TX United States	The University of Texas at Austin	Physics
<a href="#">Anne Braseby</a> anne.braseby@austin.ut...	Austin, TX United States	University of Texas @ Austin	
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# share




*PI Member since:*  
06/05/2012


**I use PI in:**  
Mechanics,  
Electromagnetism




## Eric Mazur

 [eric@learningcatalytics.com](mailto:eric@learningcatalytics.com)

 Physics

 Cambridge, MA  
United States

 Harvard University

**PI User?** Expert

Show Eric's ConceptTests on Learning  
Catalytics

### What should the PI community know about me?

Physicist, educator, author, lecturer, Harvard professor, founder SiOnyx & Learning Catalytics, developer of Peer Instruction, early adopter of new technologies

### Other Information:

**I teach :**

Introductory Undergraduates  
Intermediate Undergraduates  
Faculty (e.g. Workshops)  
Other Audiences

**Professional Role:**

Primarily research, some instruction, some admin

**Class (or Audience)  
Size:**

Small (1-25)  
Medium (26-75)  
Large (76-200)  
Extra-Large (201-500)  
Mega (500+)





***[scholar.harvard.edu/julieschell](https://scholar.harvard.edu/julieschell)***

***twitter - @julieschell***