Engaging Students One-on-One, All At Once
Session 1

Peer Instruction Online Course
Hong Kong Polytechnic University
5 June 2014

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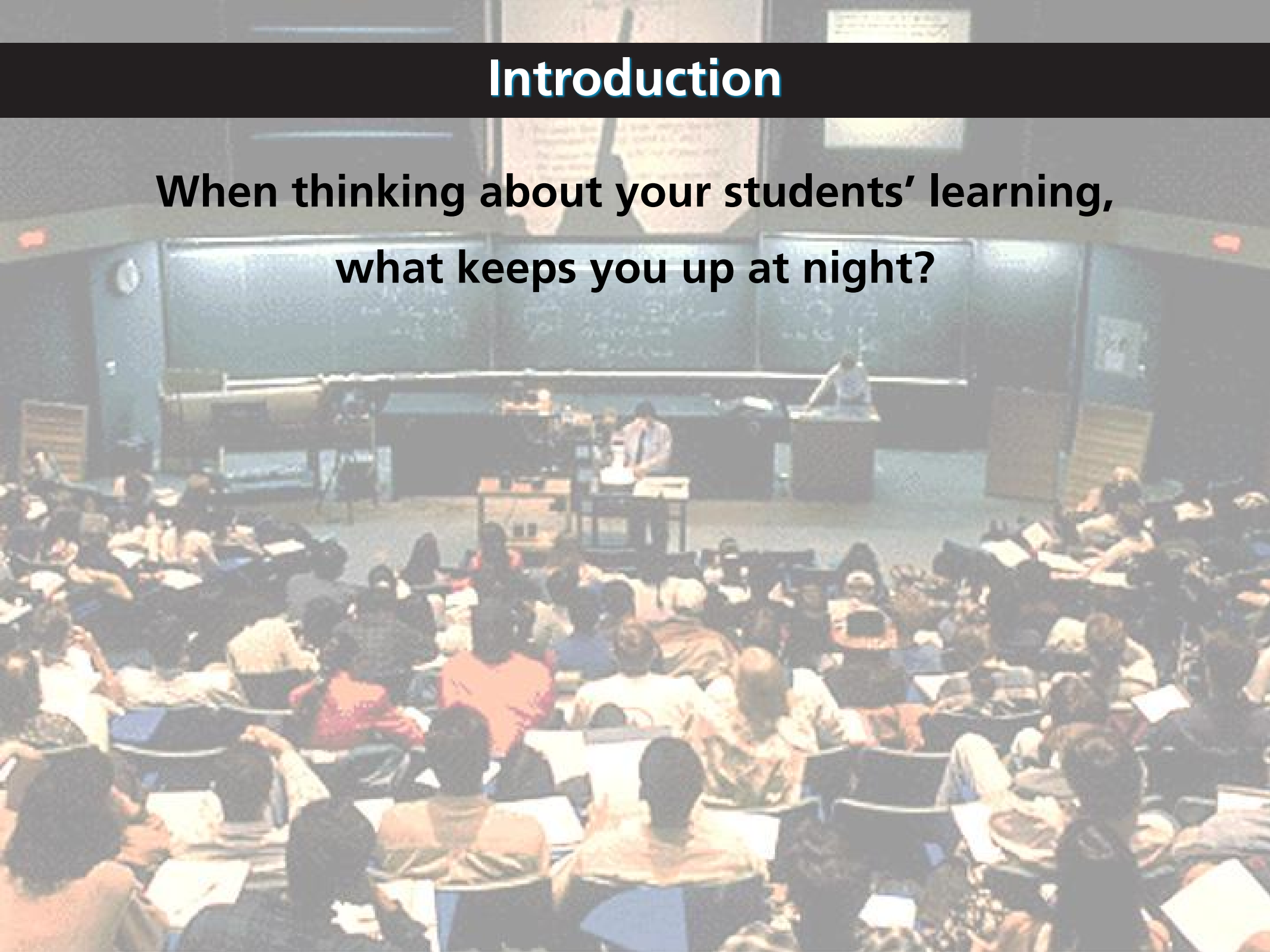
Introduction



When thinking about your students' learning, what keeps you up at night?

Introduction

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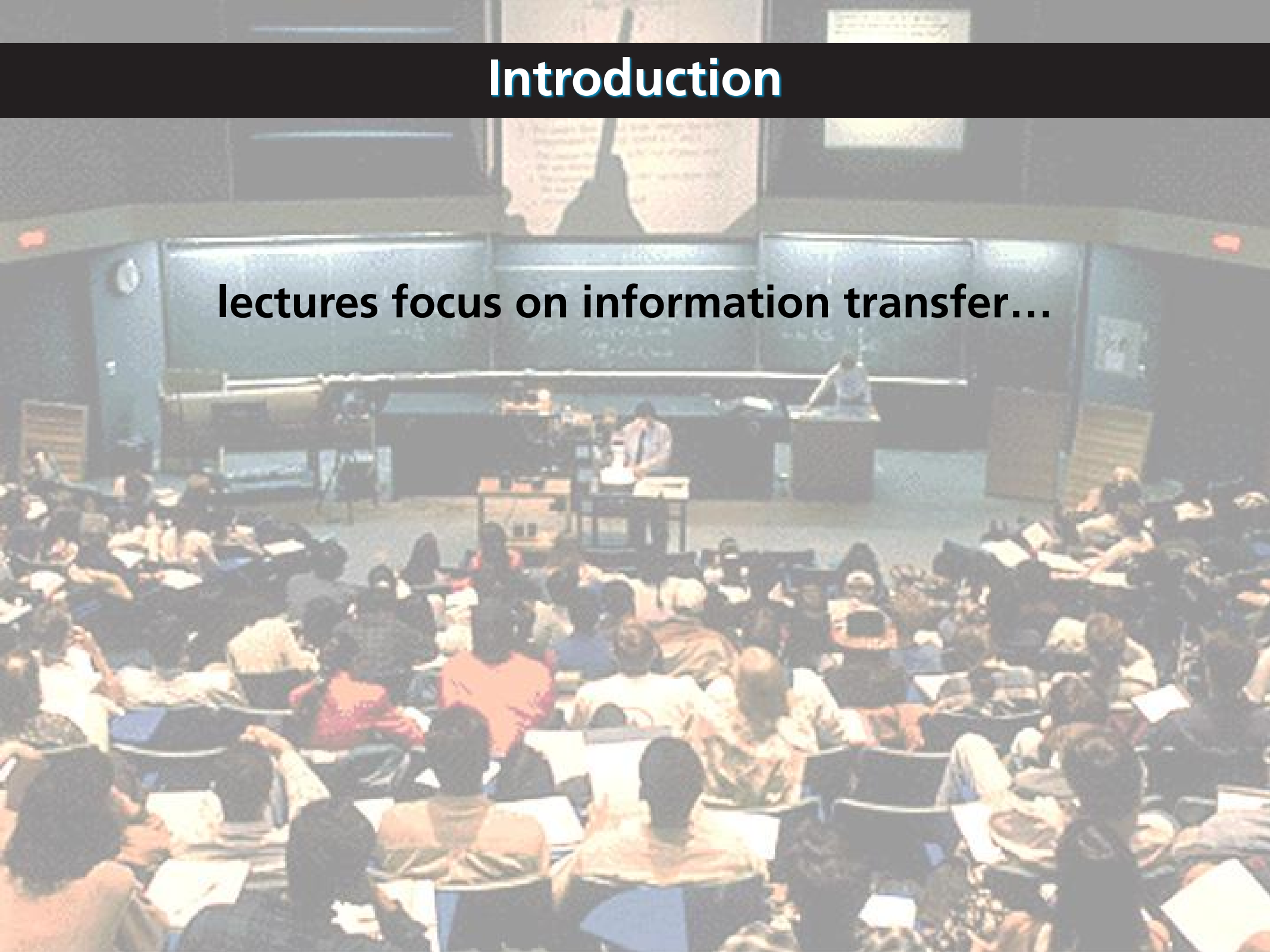
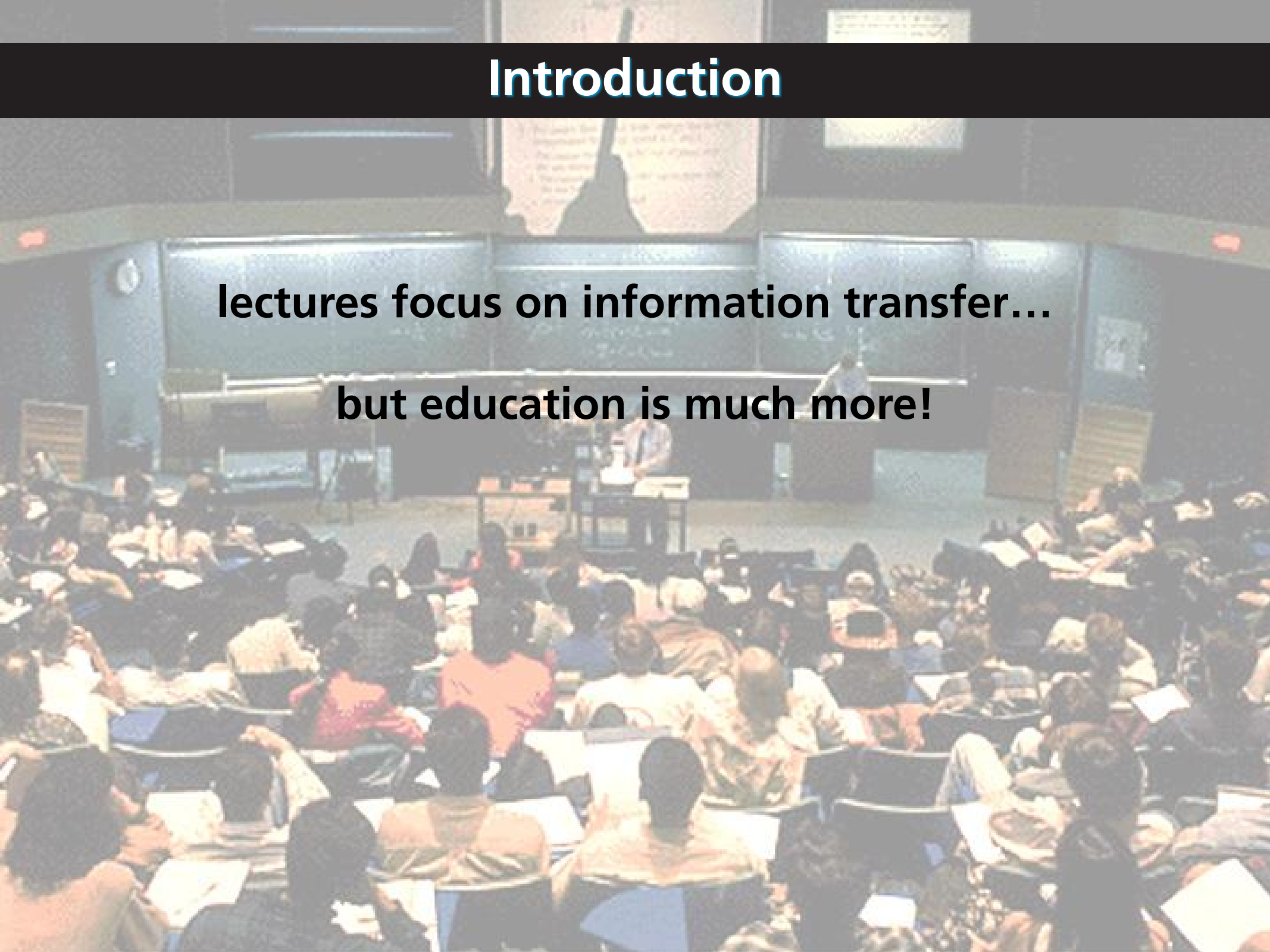
Introduction



lectures focus on information transfer…

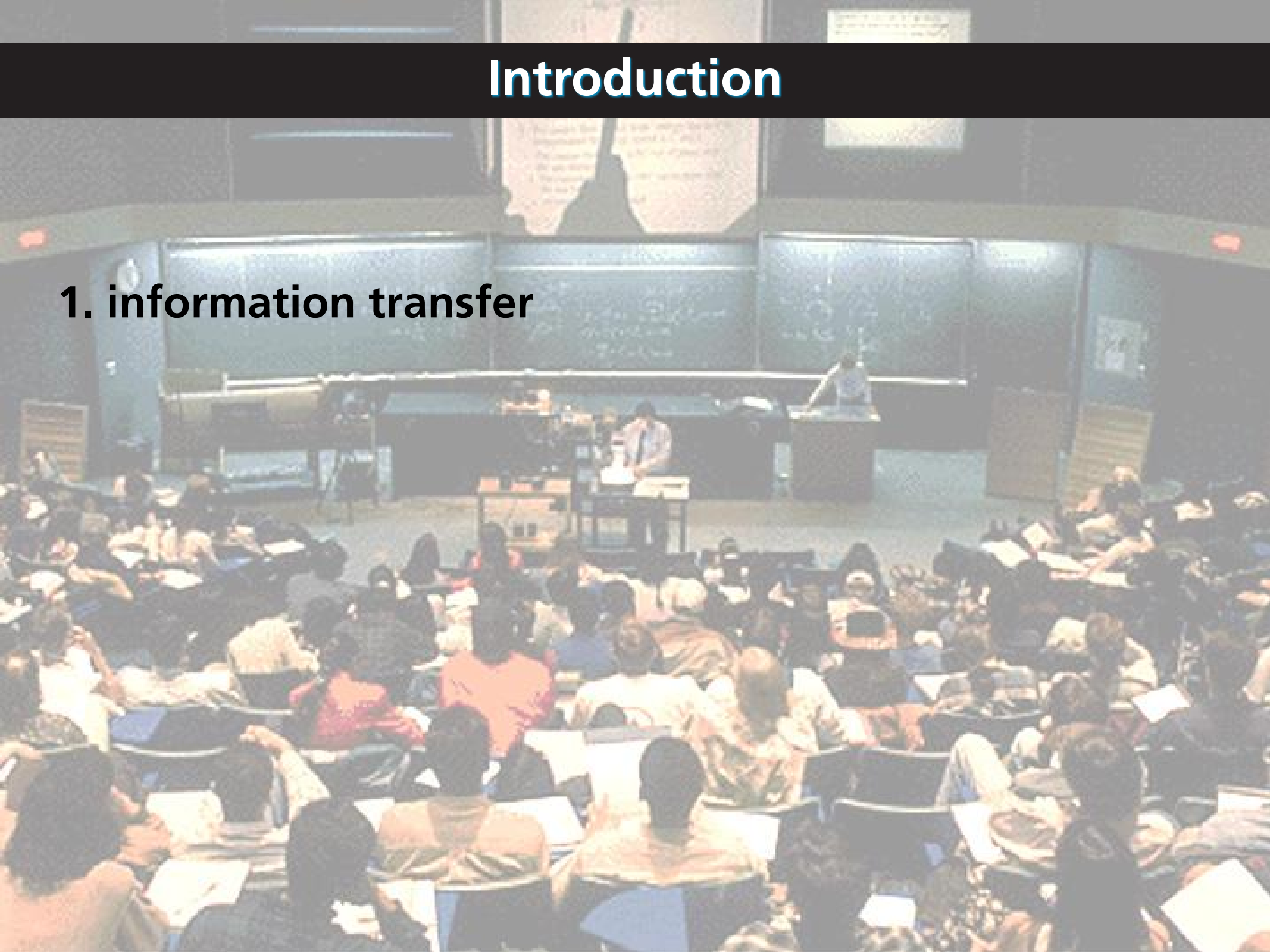
Introduction



lectures focus on information transfer…

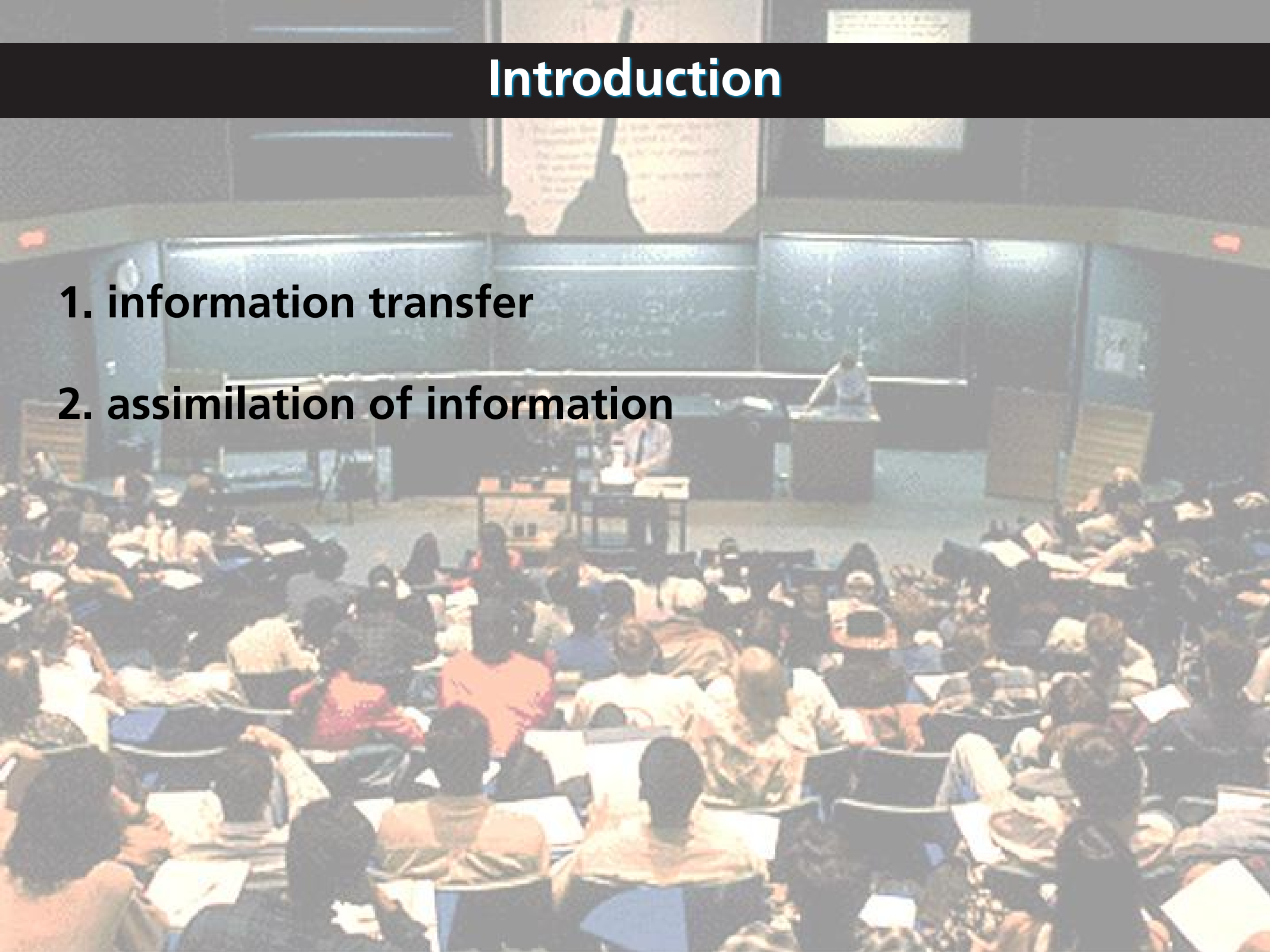
but education is much more!

Introduction



1. information transfer

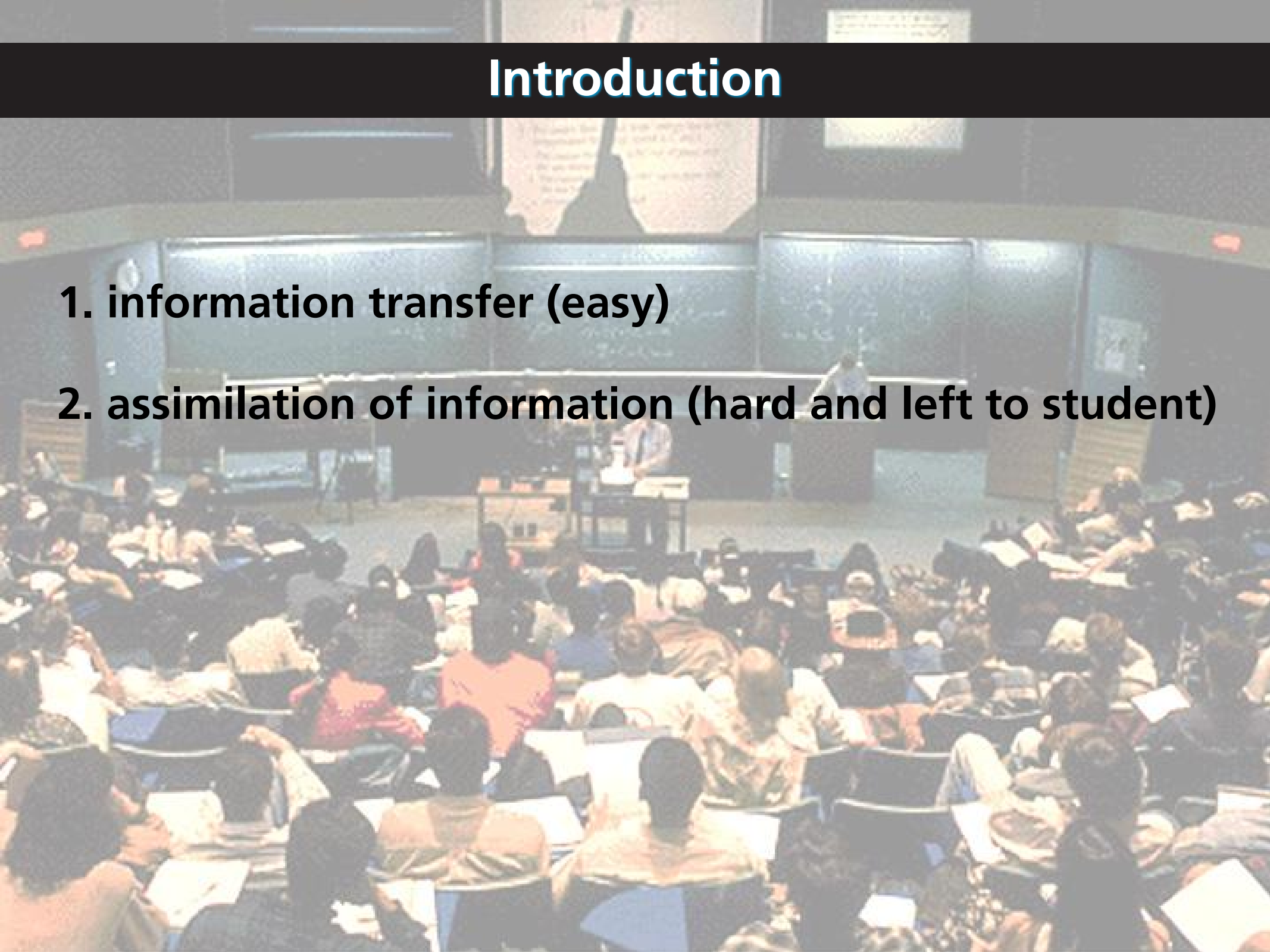
Introduction



1. information transfer

2. assimilation of information

Introduction



1. information transfer (easy)

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

Introduction

Solution: move information transfer out of classroom!

Introduction

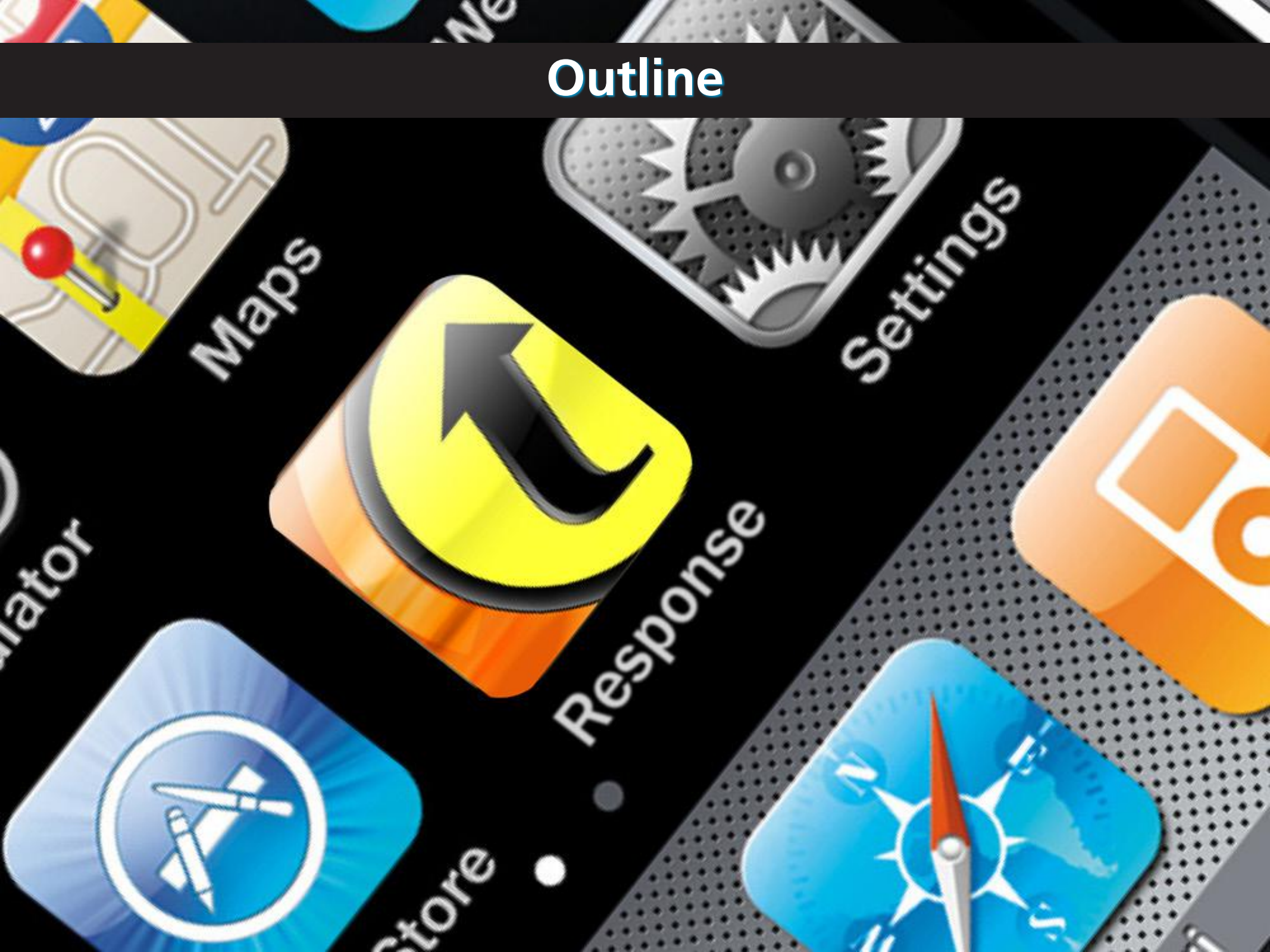
How to move information transfer out of classroom?

Introduction

How to move information transfer out of classroom?

Use JiTT (before class) and PI (in class)!

Outline



Outline

- PI & JiTT Overview
- Implementing PI & JiTT
- ConcepTests

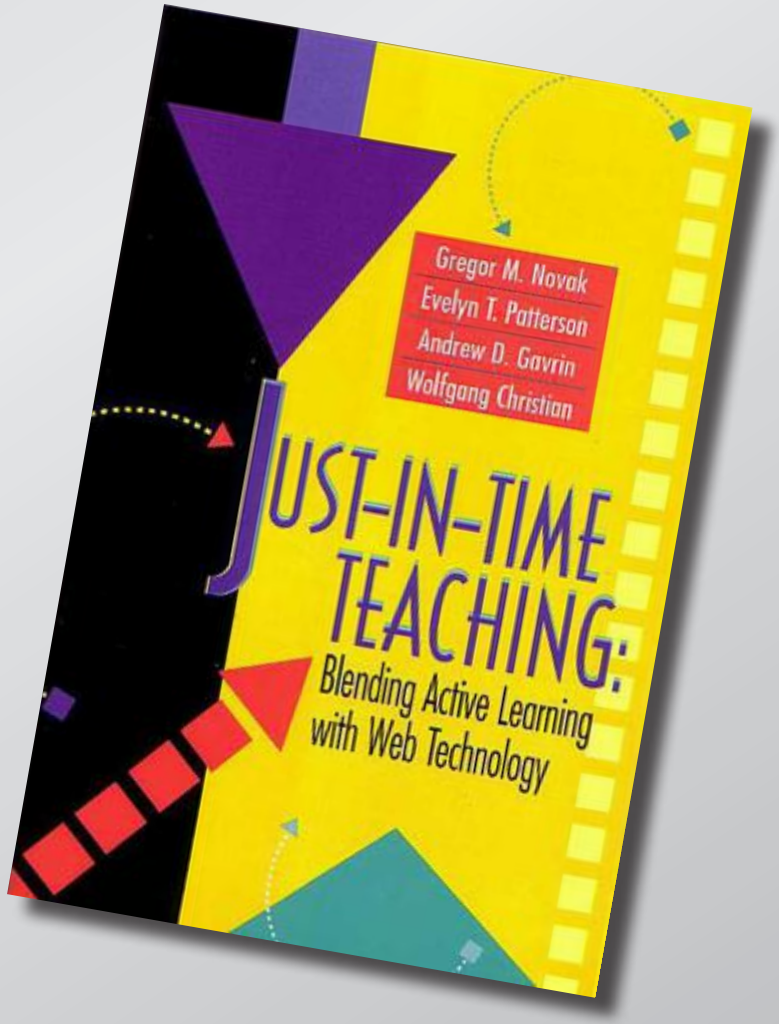
PI & JiTT Overview

"How to motive students to read before class?"

PI & JiTT Overview

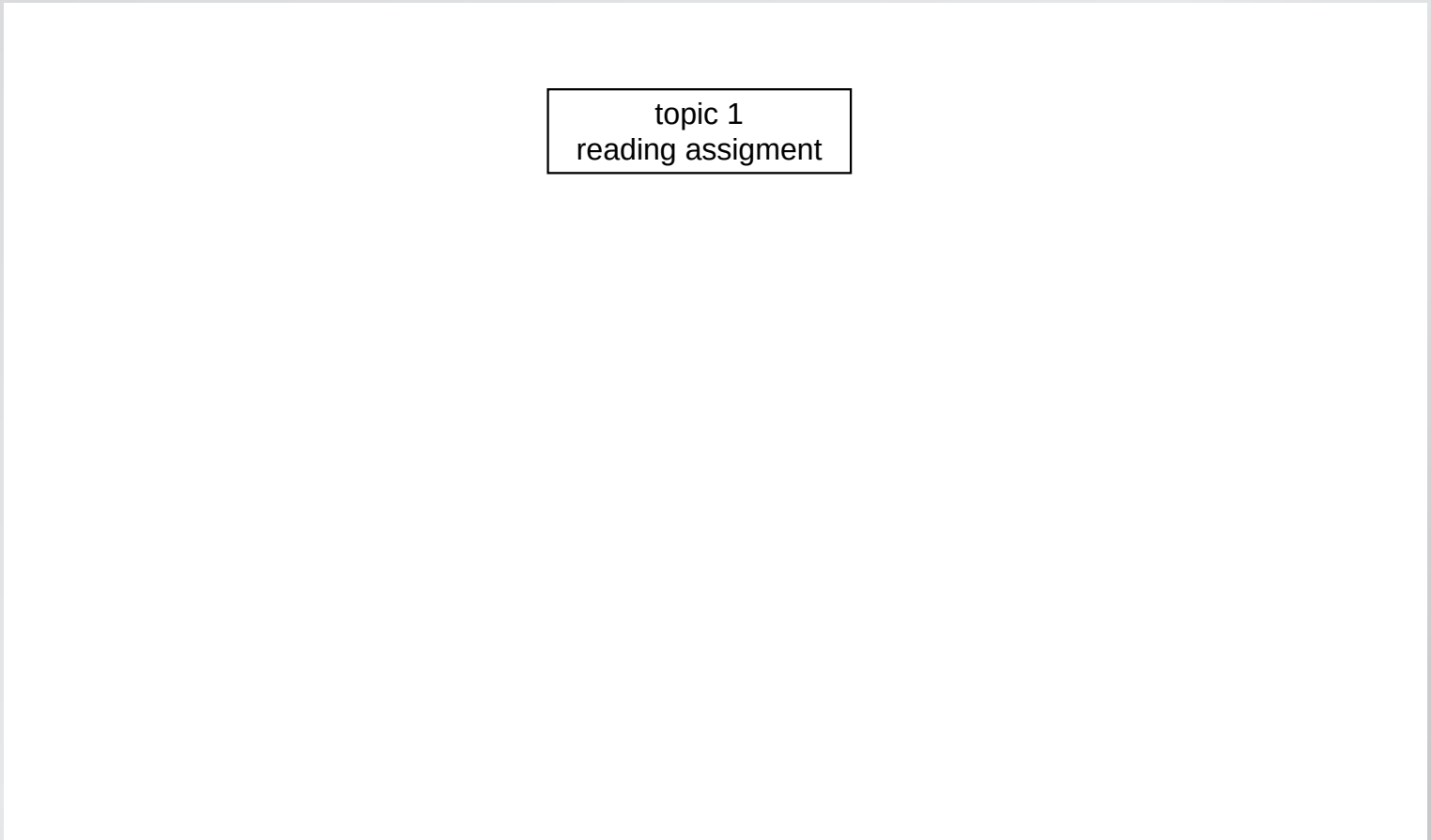
Just-in-time-Teaching (JiTT)

www.jitt.org



PI & JiTT Overview

JiTT workflow



PI & JiTT Overview

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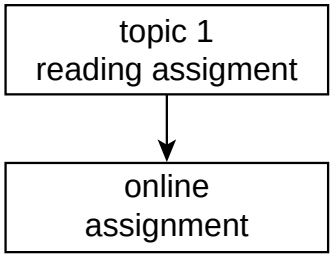

PI & JiTT Overview

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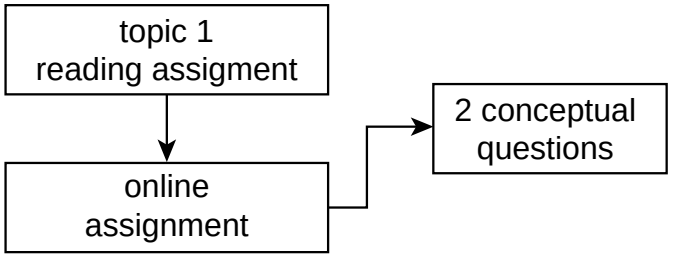
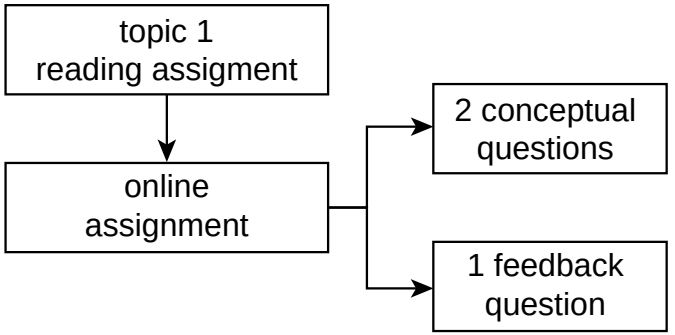


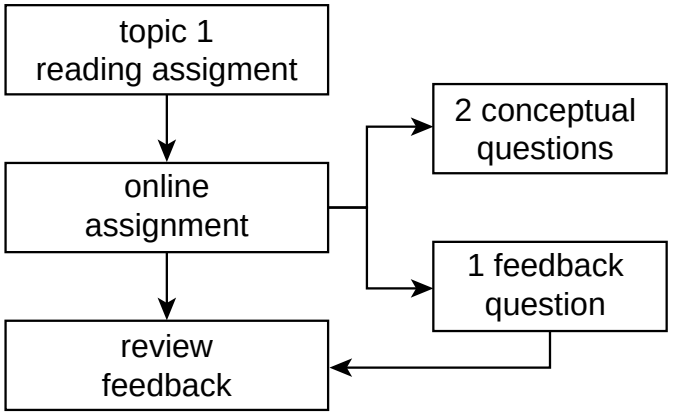
PI & JiTT Overview

JiTT workflow



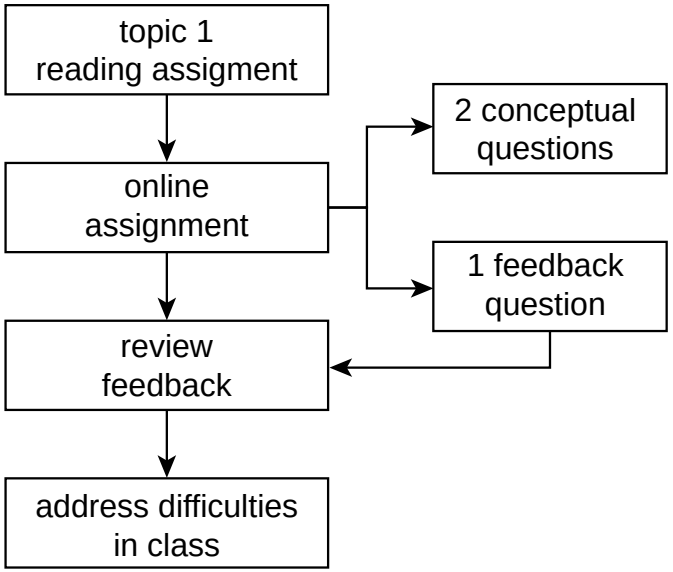
PI & JiTT Overview

JiTT workflow



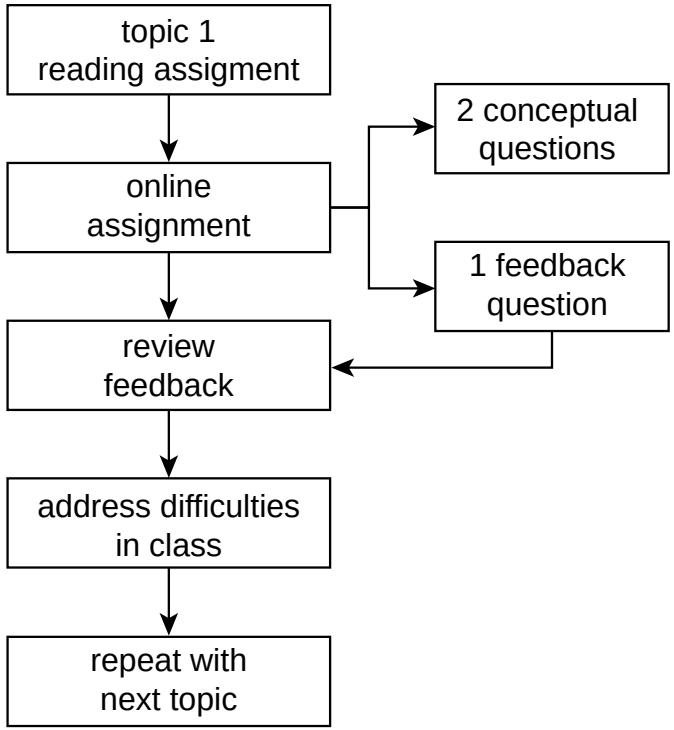
PI & JiTT Overview

JiTT workflow



PI & JiTT Overview

JiTT workflow



PI & JiTT Overview

"My impression is that the feedback question is the best indicator of where to focus attention. Yes?"

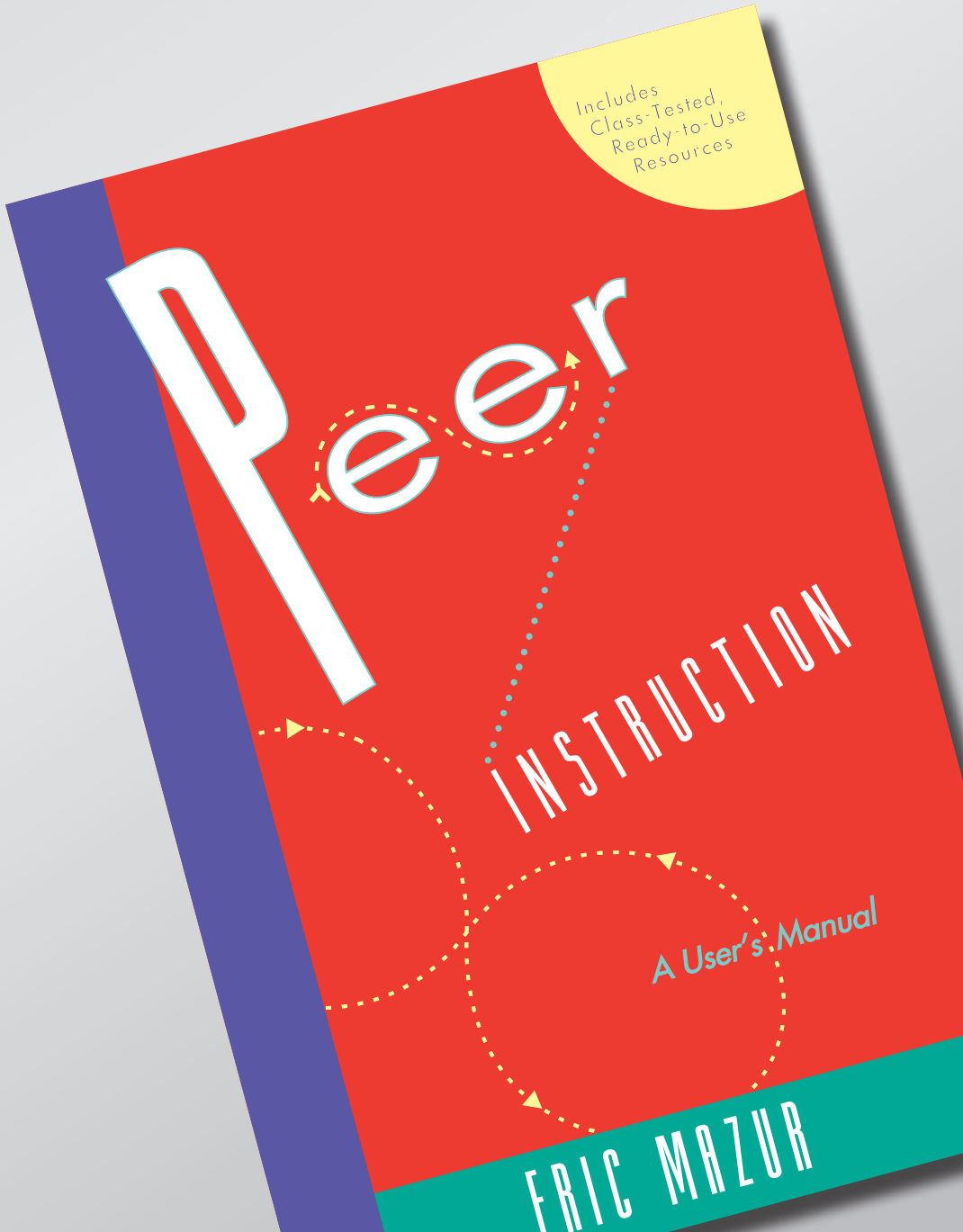
PI & JiTT Overview

JiTT:

- prepares you for class
- prepares students for class
- helps you address student difficulties

PI & JiTT Overview

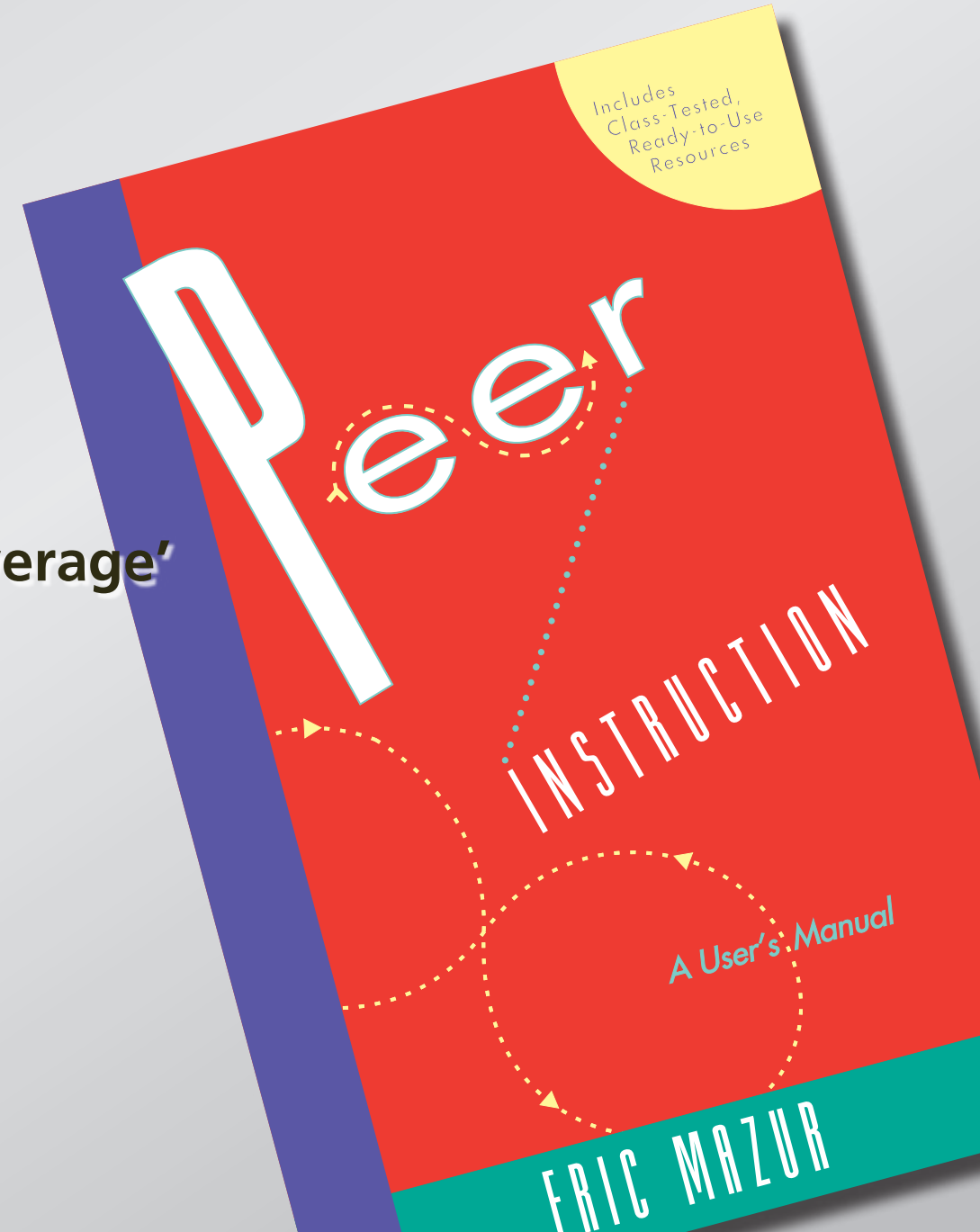
Peer Instruction (PI)



PI & JiTT Overview

Main features:

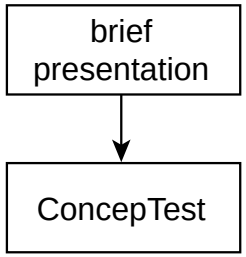
- **pre-class reading**
- **in-class: depth, not 'coverage'**
- **ConcepTests**



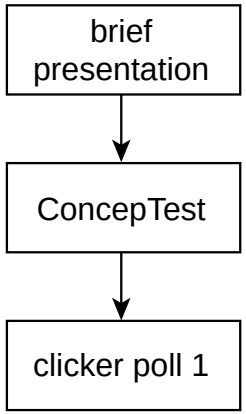
PI & JiTT Overview

brief presentation

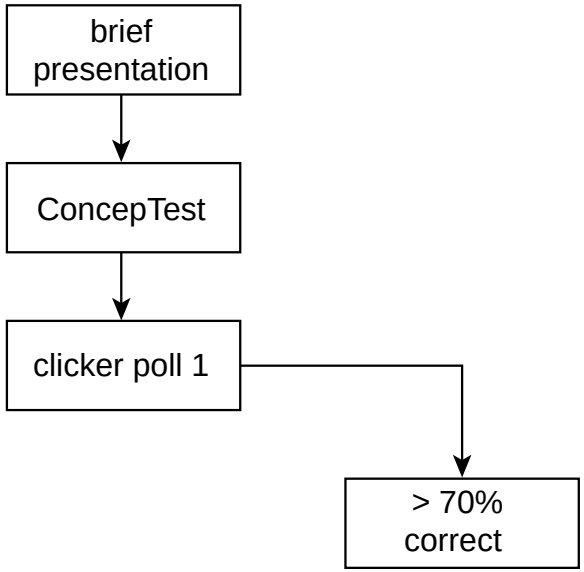
PI & JiTT Overview



PI & JiTT Overview



PI & JiTT Overview



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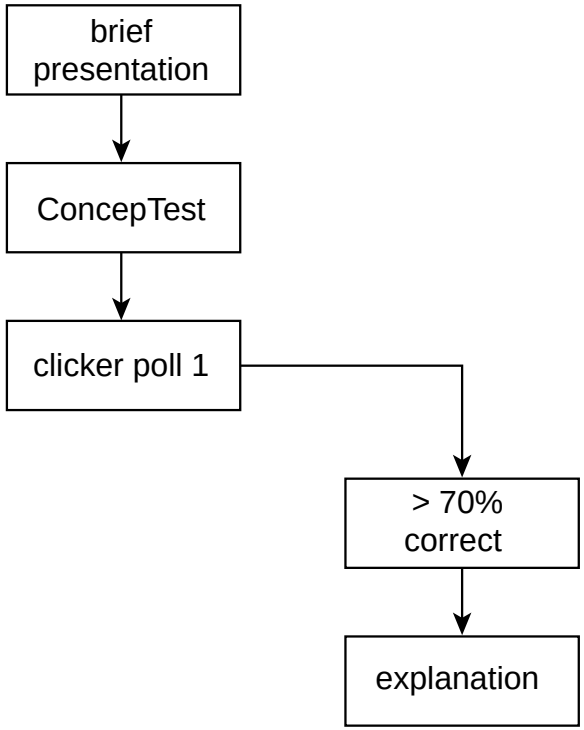

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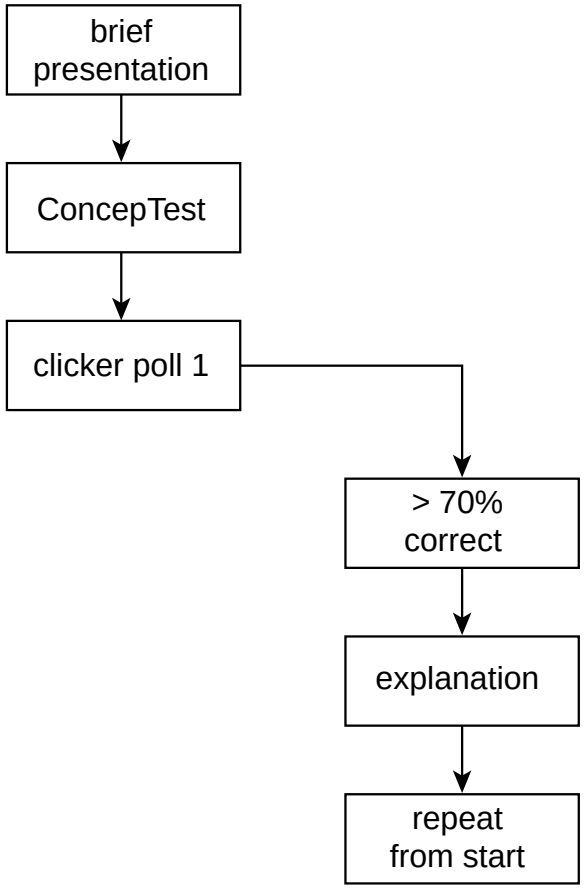

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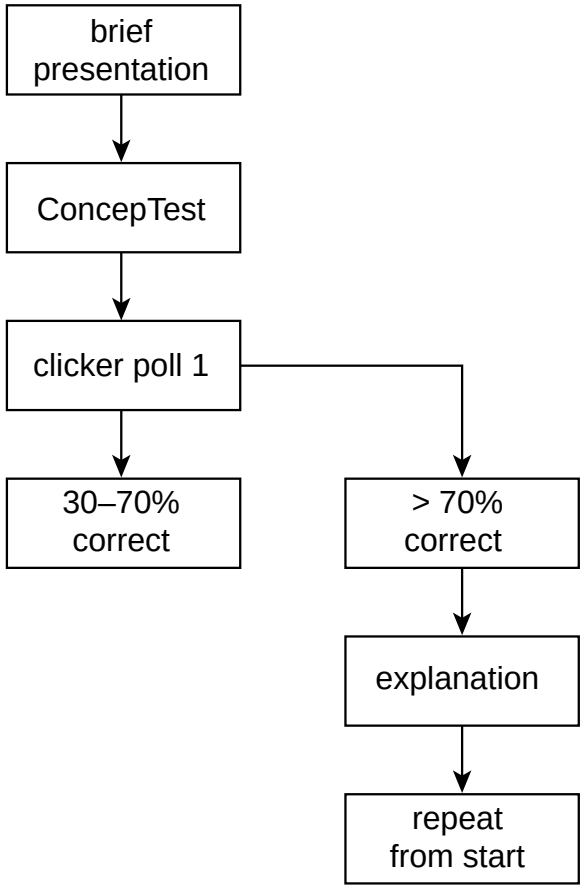

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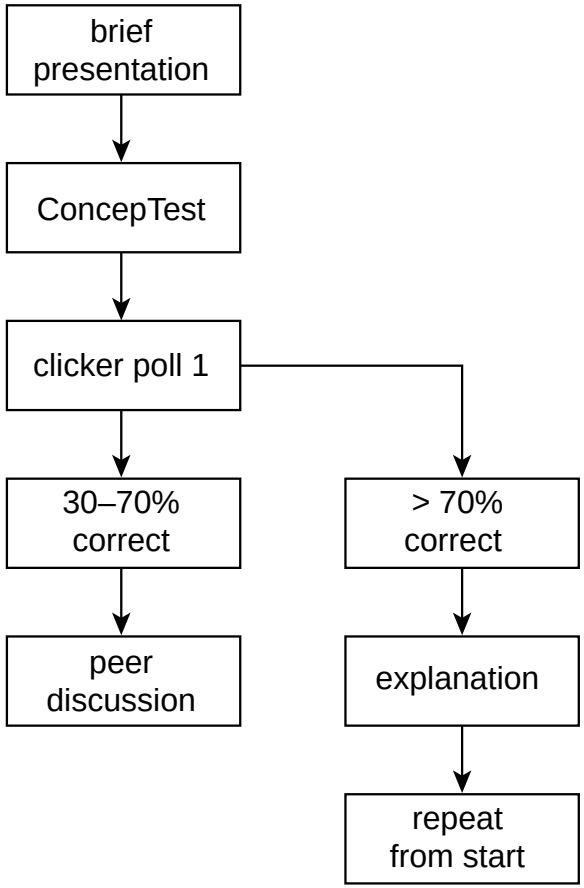

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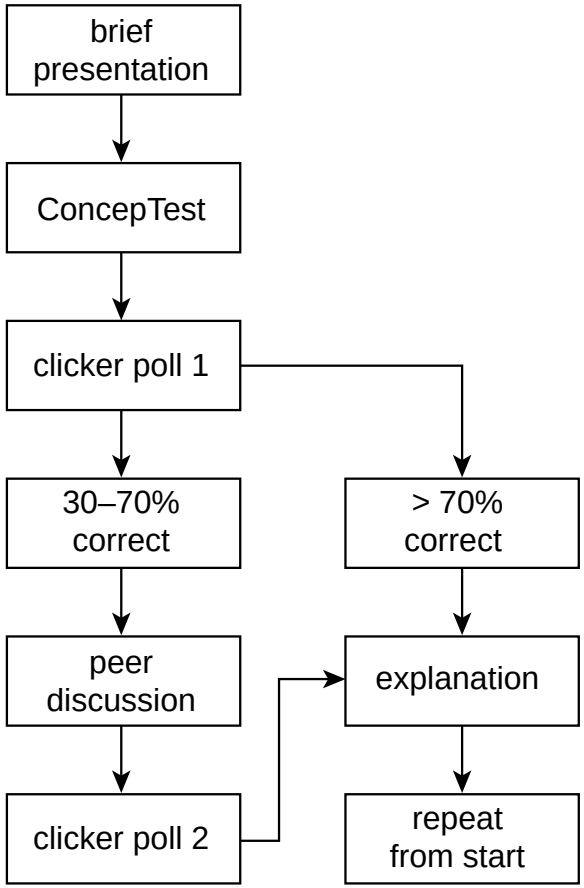

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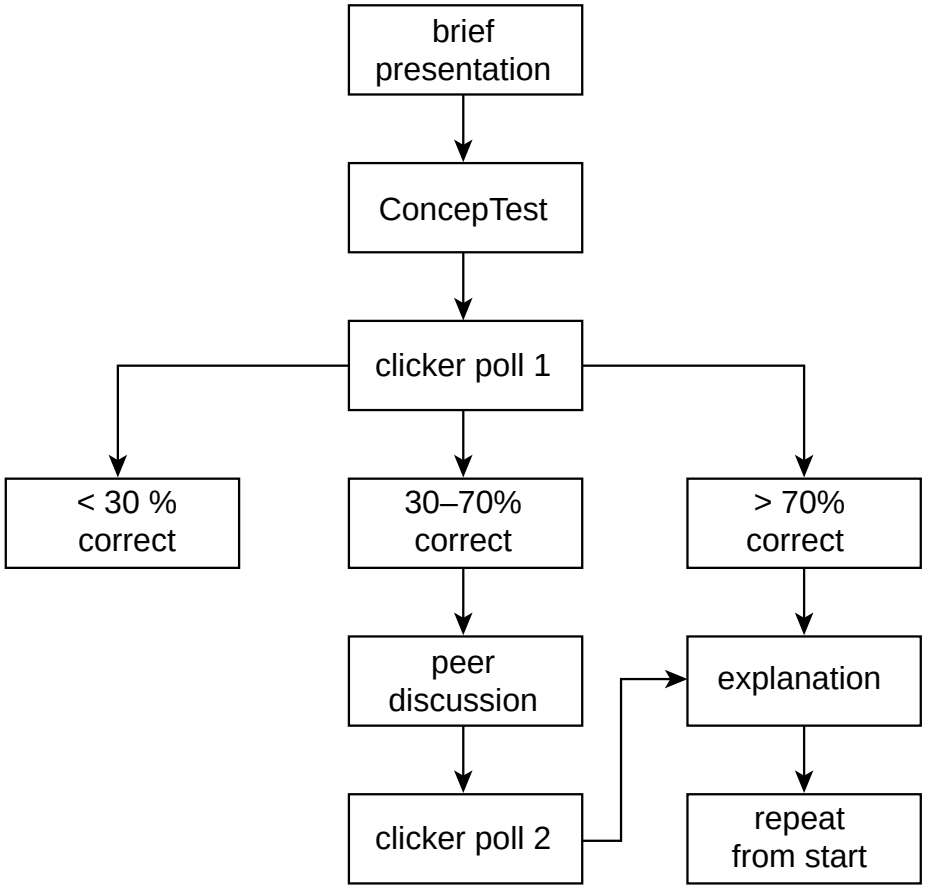
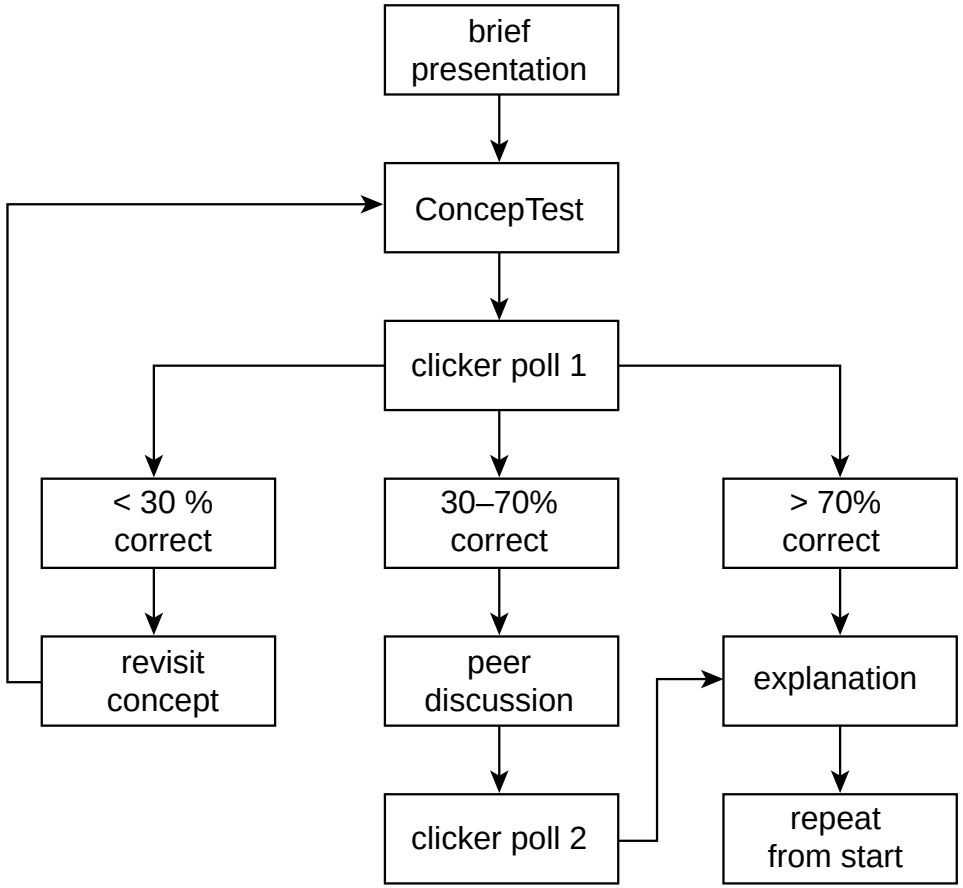


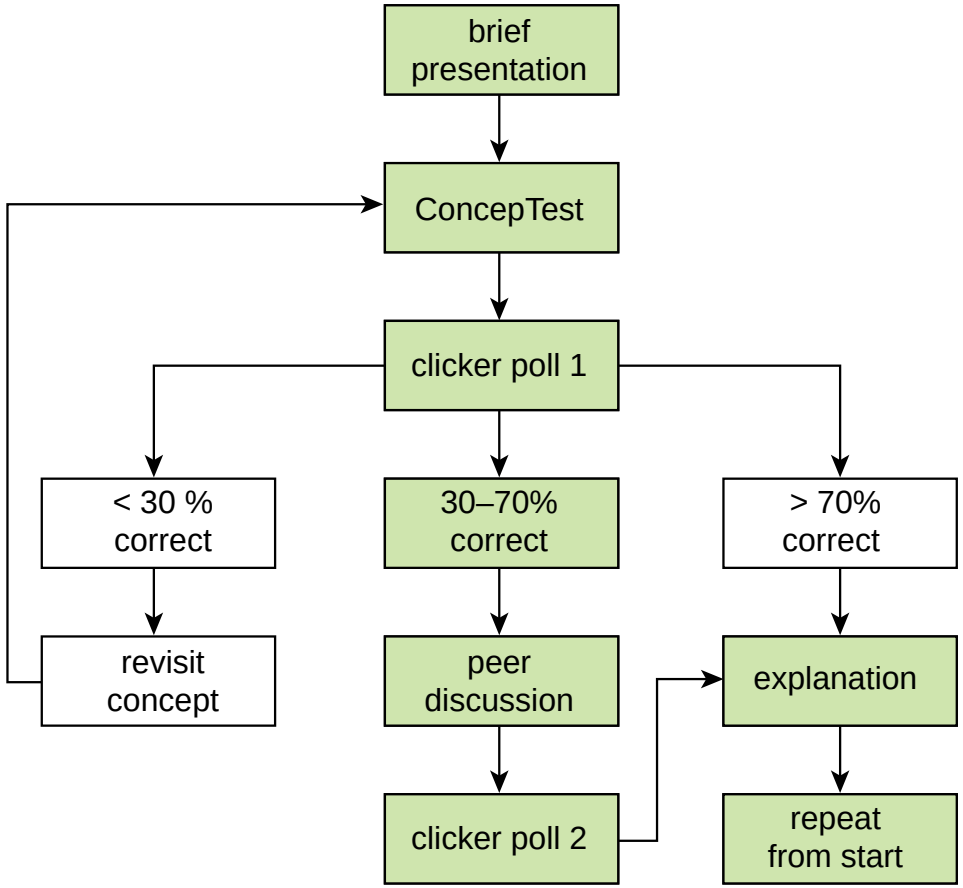
PI & JiTT Overview



PI & JiTT Overview

"How to moderate discussion with only a handful (or only one) faculty member in the classroom?"

PI & JiTT Overview



PI & JiTT Overview

"What to do if some students don't care and just use PI time to chit-chat?"

PI & JiTT Overview

PI:

- **helps students overcome difficulties**
- **encourages deep learning**
- **provides depth, not “coverage”**
- **helps you become aware of misconceptions**

PI & JiTT Overview

"What to do if students who know the answer sit together and students who don't know the answer sit together?"

PI & JiTT Overview

find someone with a *different* answer

Let's try it!

Online Polling System

1. Go to learningcatalytics.com/demo

2. Enter info, click "Start"

3. Join session 123456789

Let's try it!

statistics

Let's try it!

Let's try it!

1/6

Let's try it!

Let's try it!

1/36

Let's try it!

Let's try it!

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

Let's try it!

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What is the most likely outcome?

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

What is the most likely outcome?

1. It rains only in London
2. It rains only in Chicago
3. It rains in London and Chicago
4. It rains in London or Chicago

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

What is the most likely outcome?

1. It rains only in London
2. It rains only in Chicago
3. It rains in London and Chicago
4. It rains in London or Chicago

you got all fired up!

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

What is the most likely outcome?

1. It rains only in London
2. It rains only in Chicago
3. It rains in London and Chicago
4. It rains in London or Chicago

Let’s try it!

Before I tell you the answer, let’s analyze what happened.

Let's try it!

Before I tell you the answer, let's analyze what happened.

You…

Let's try it!

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment

Let's try it!

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment
2. externalized your answer

Let's try it!

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning

Let's try it!

Before I tell you the answer, let's analyze what happened.

You…

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning
4. became emotionally invested in the learning process

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

What is the most likely outcome?

1. It rains only in London
2. It rains only in Chicago
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4. It rains in London or Chicago

Let's try it!

A meteorologist predicts a 40% chance of rain in London and a 70% chance in Chicago.

What is the most likely outcome?

1. It rains only in London
2. It rains only in Chicago
3. It rains in London and Chicago
4. It rains in London or Chicago ✔

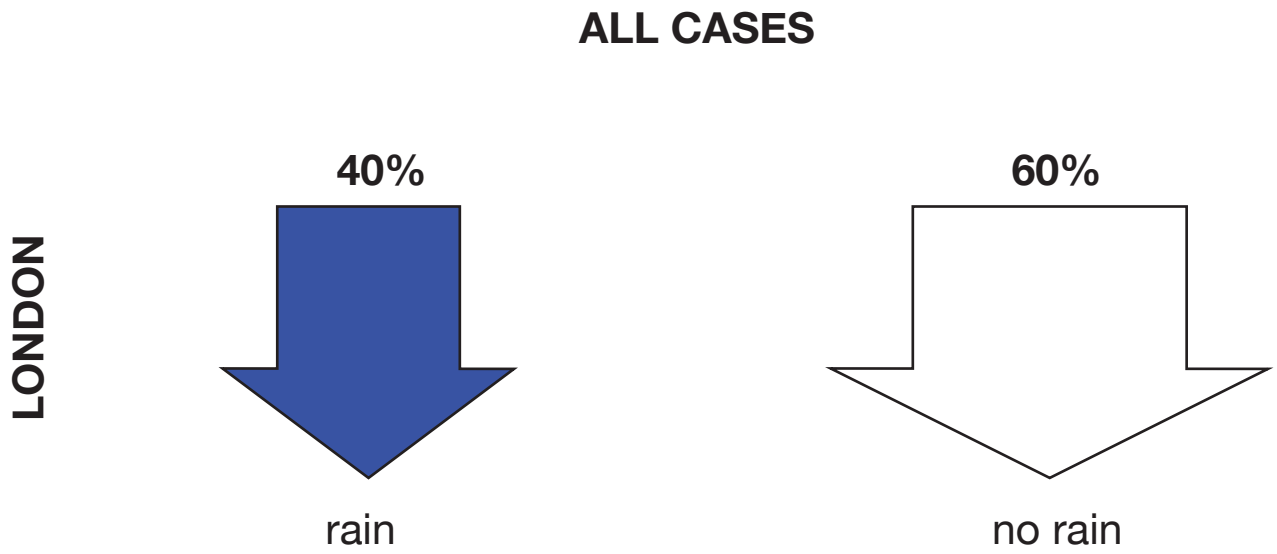
Let's try it!

ALL CASES

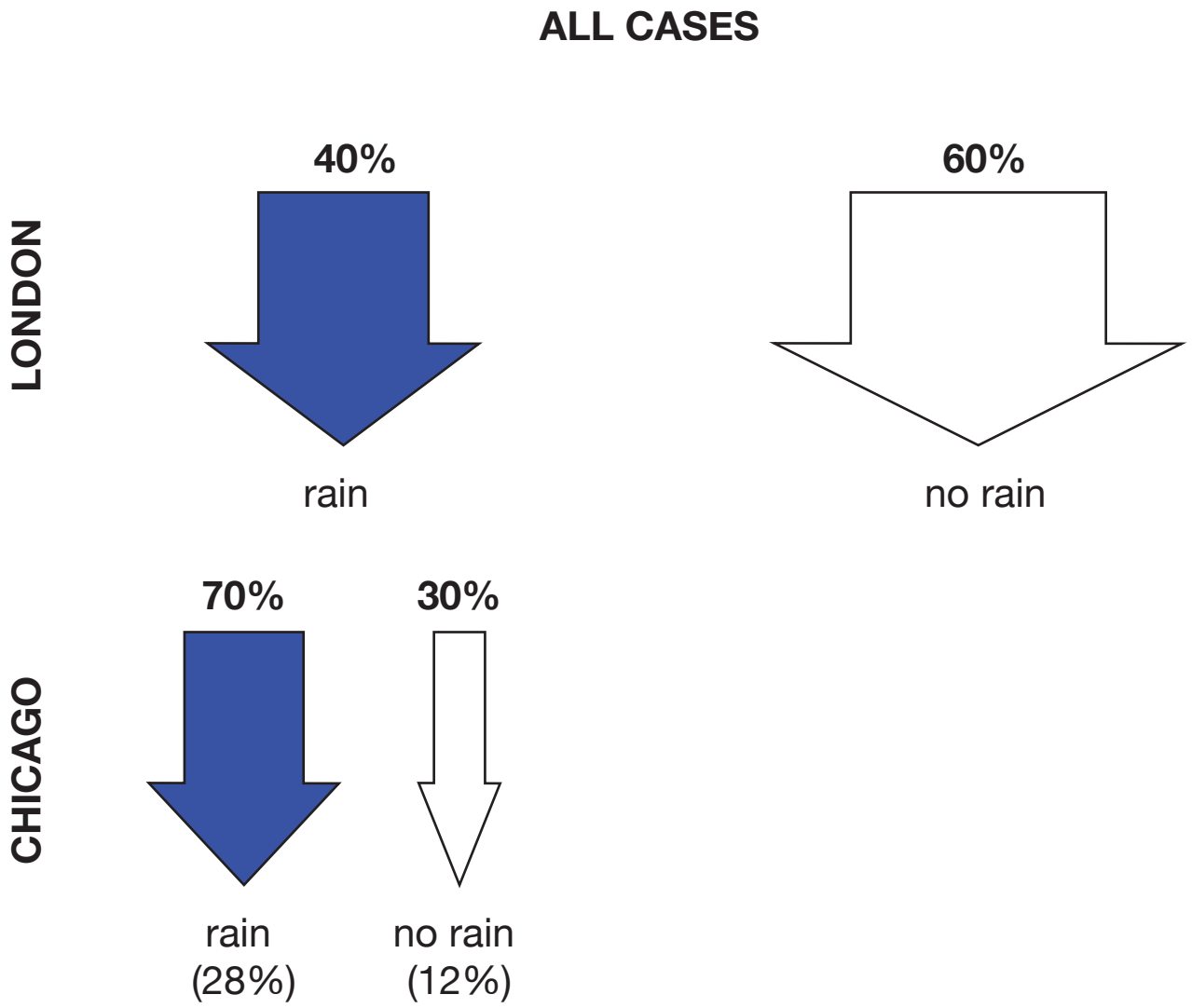
LONDON

CHICAGO

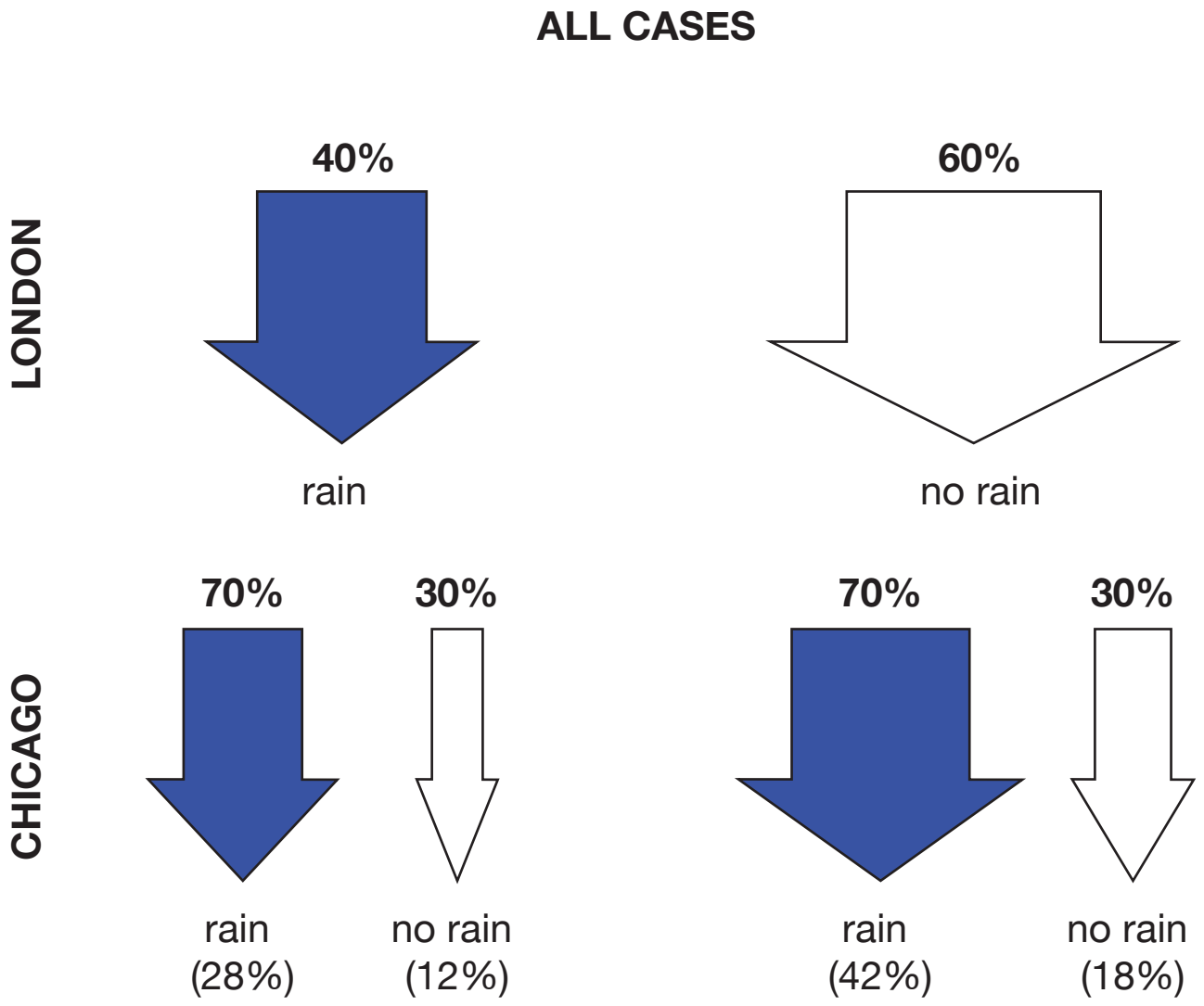
Let's try it!



Let's try it!


ALL CASES
LONDON
40%
60%
rain
no rain
CHICAGO
70%
30%
rain
(28%)
no rain
(12%)

Let's try it!


ALL CASES
LONDON
40%
60%
rain
no rain
CHICAGO
70%
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70%
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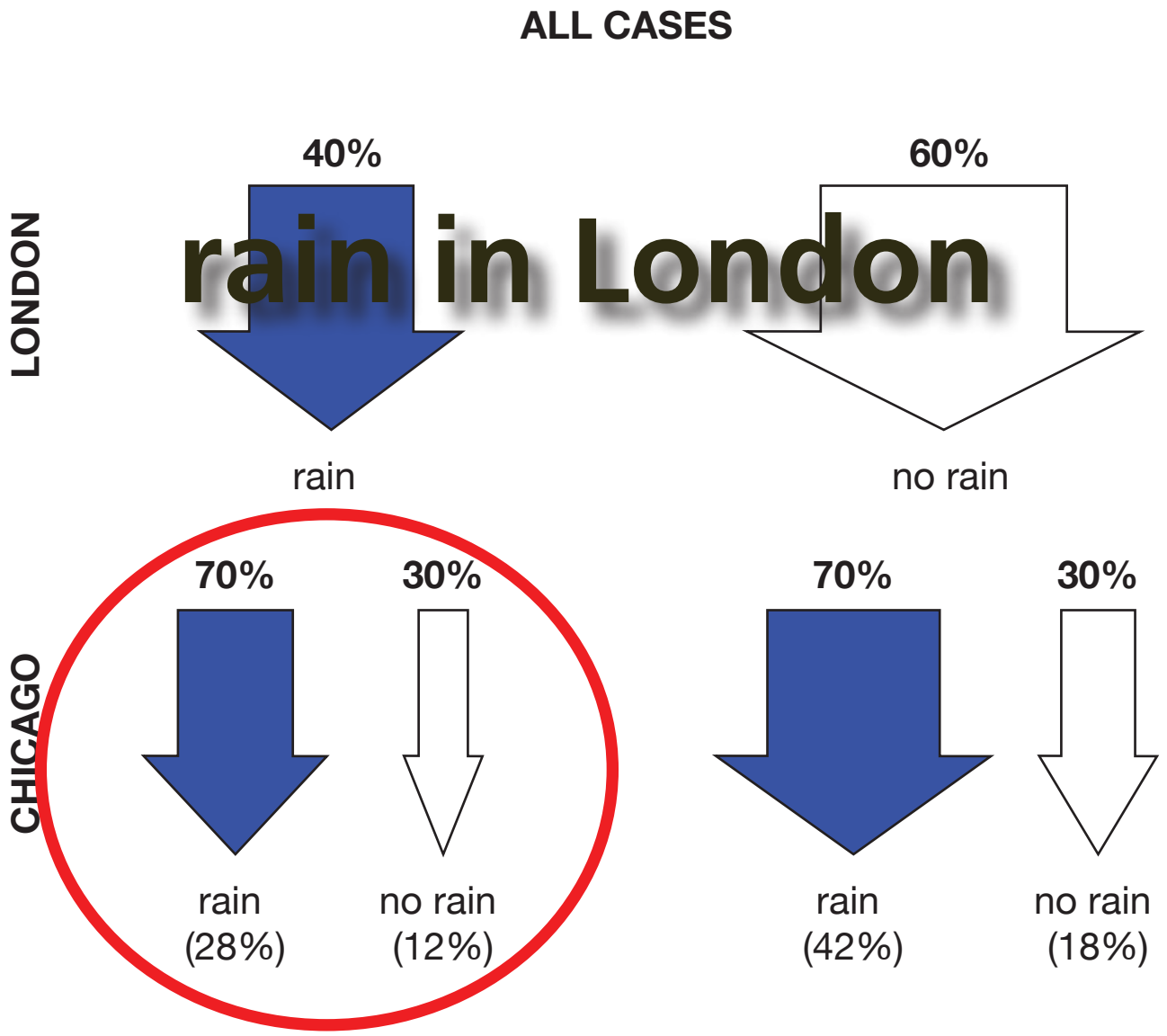
rain
(28%)
no rain
(12%)
rain
(42%)
no rain
(18%)

Let's try it!


ALL CASES
LONDON
40%
60%
rain in London
rain
no rain
CHICAGO
70%
30%
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(28%)
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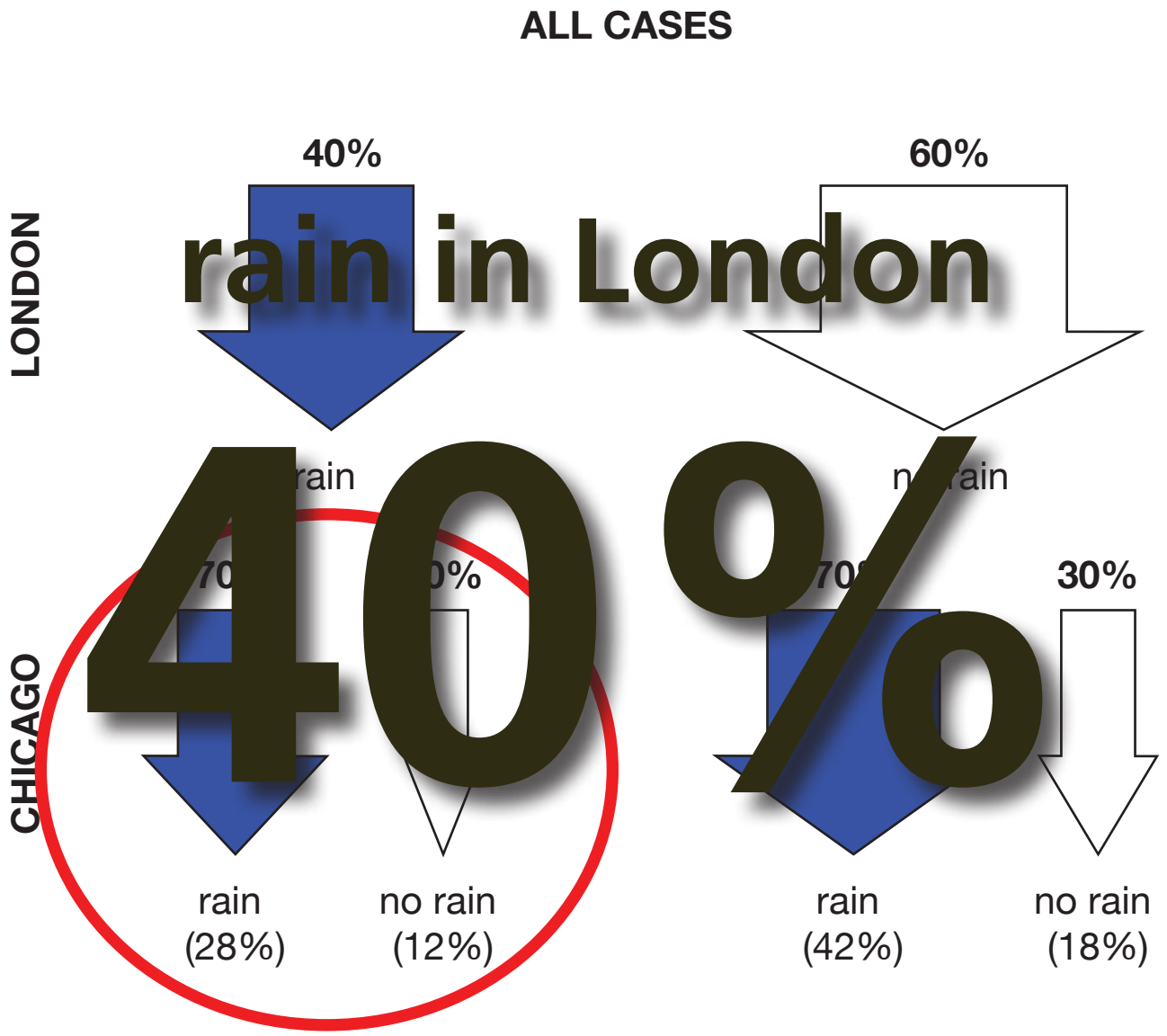
ALL CASES
40%
60%
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rain in London
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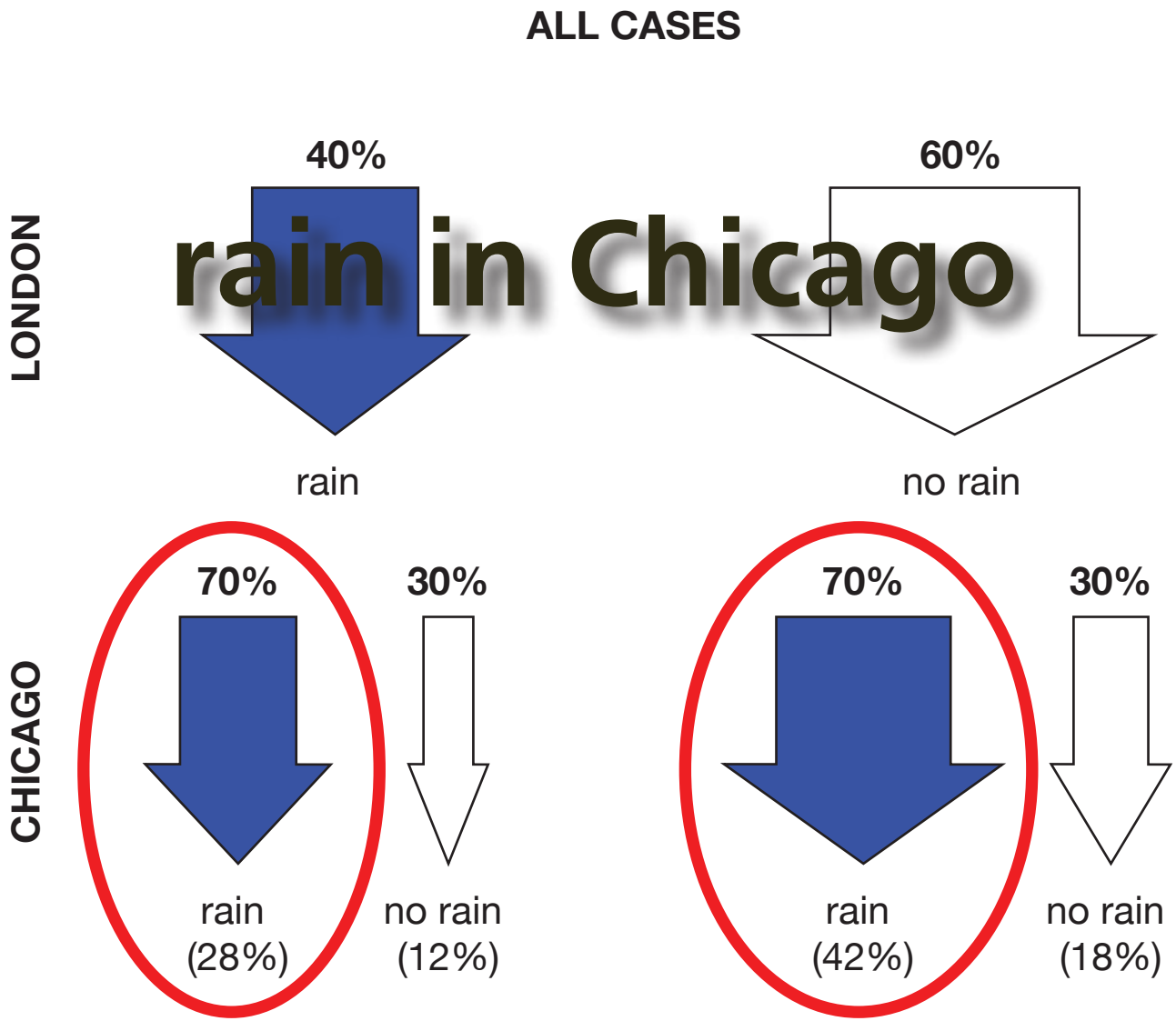
ALL CASES
LONDON
40%
60%
rain in Chicago
rain
no rain
CHICAGO
70%
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70%
30%
rain
(28%)
no rain
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rain
(42%)
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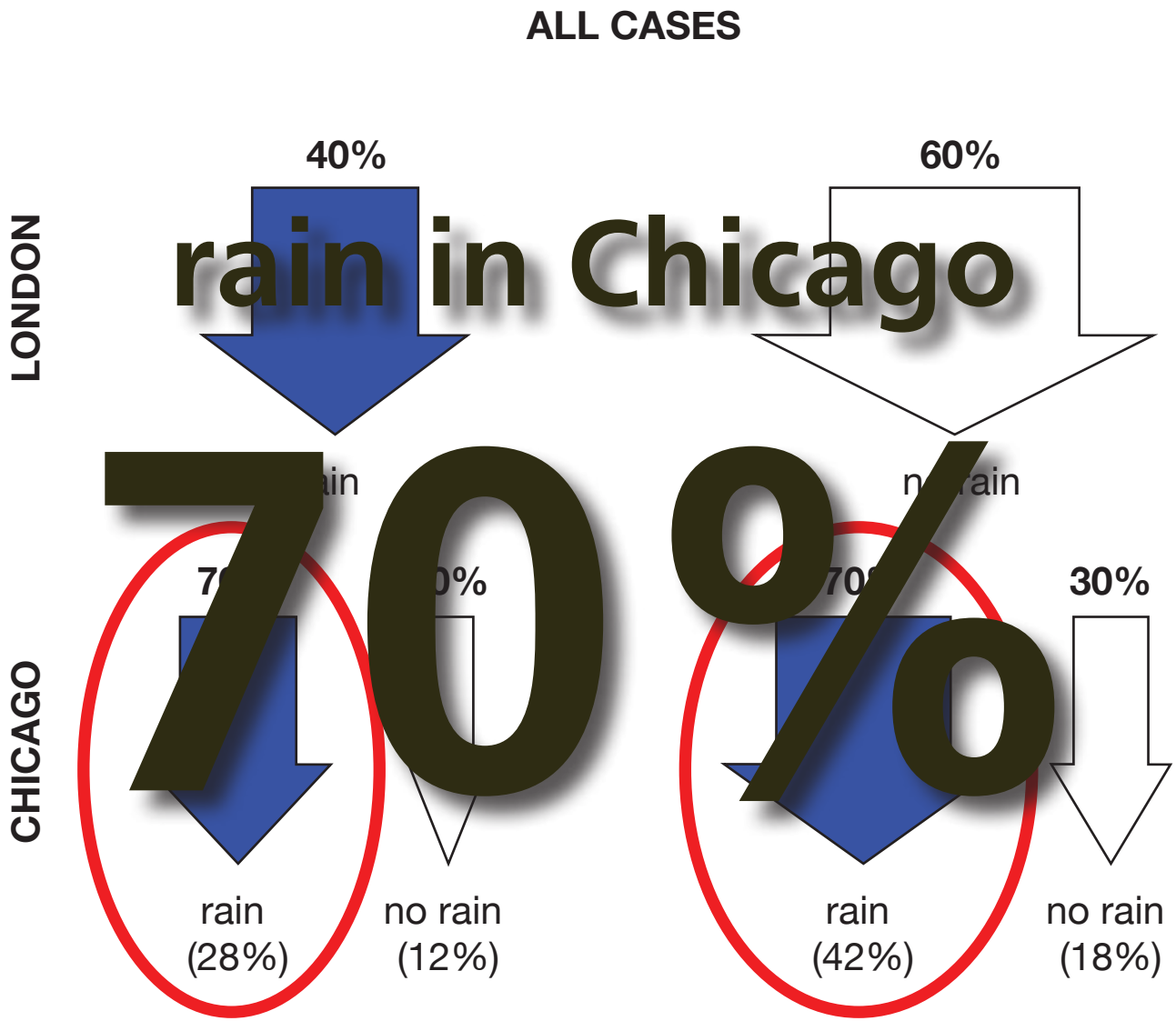
Let's try it!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40%
60%
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rain in Chicago
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(28%)
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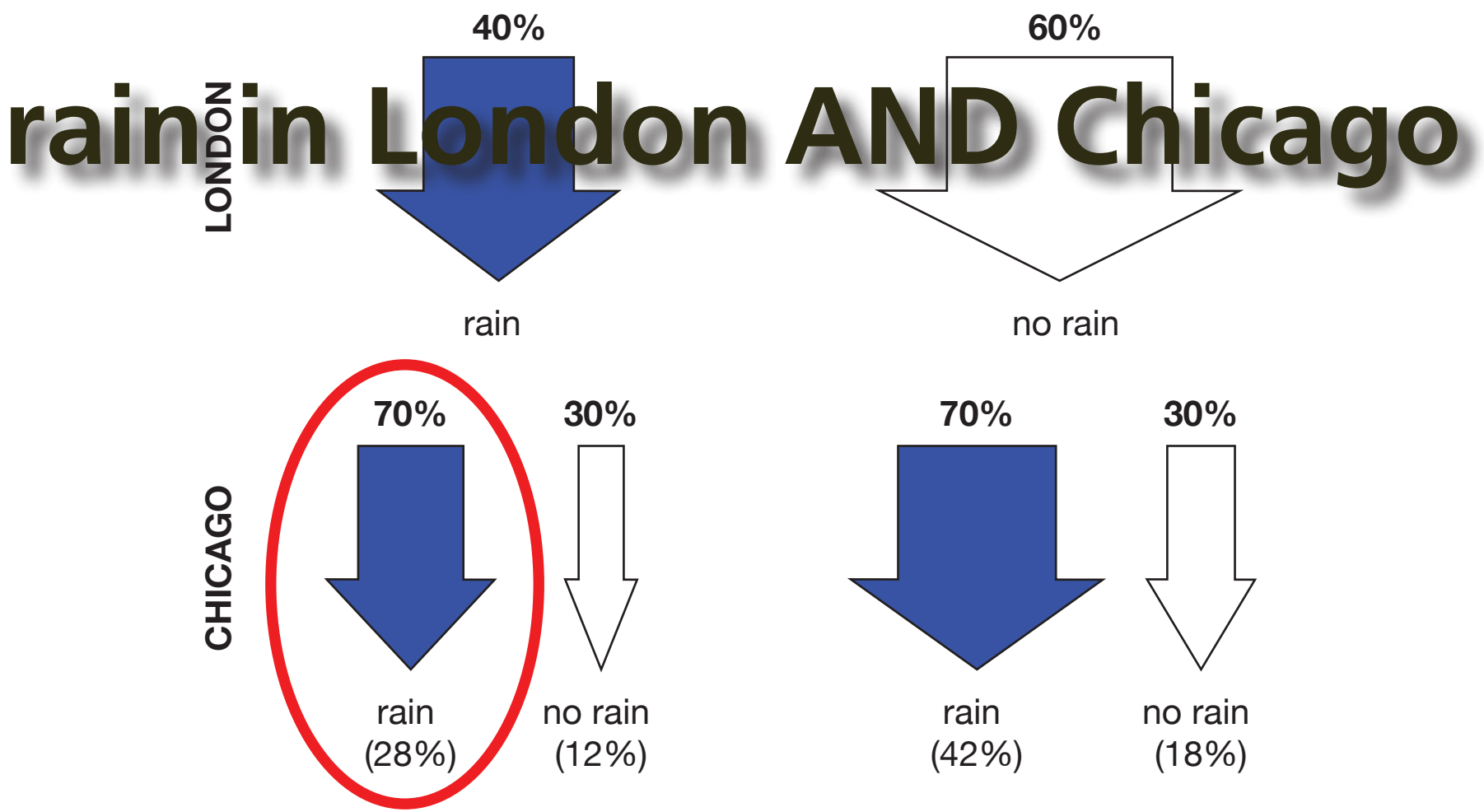
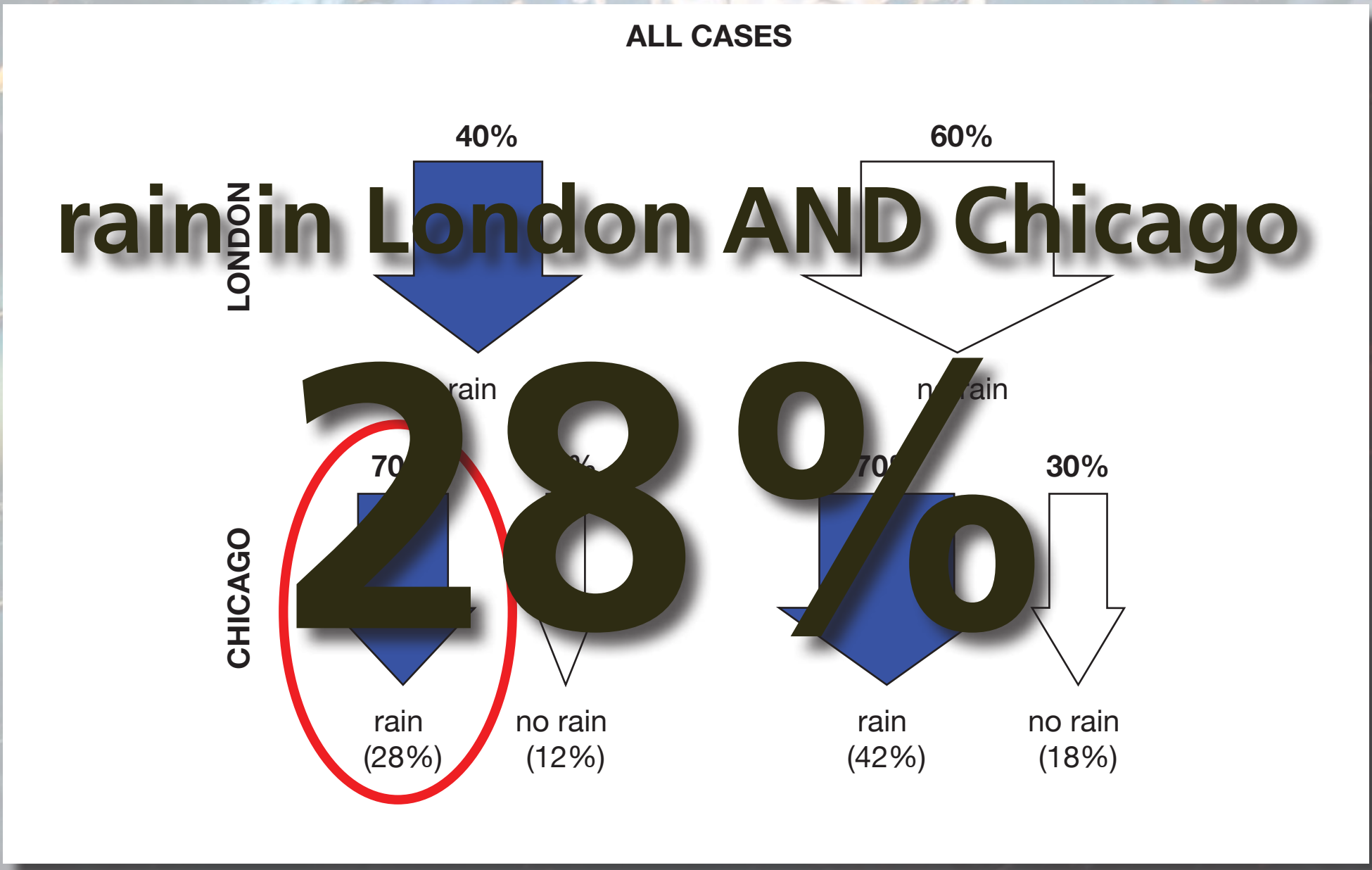
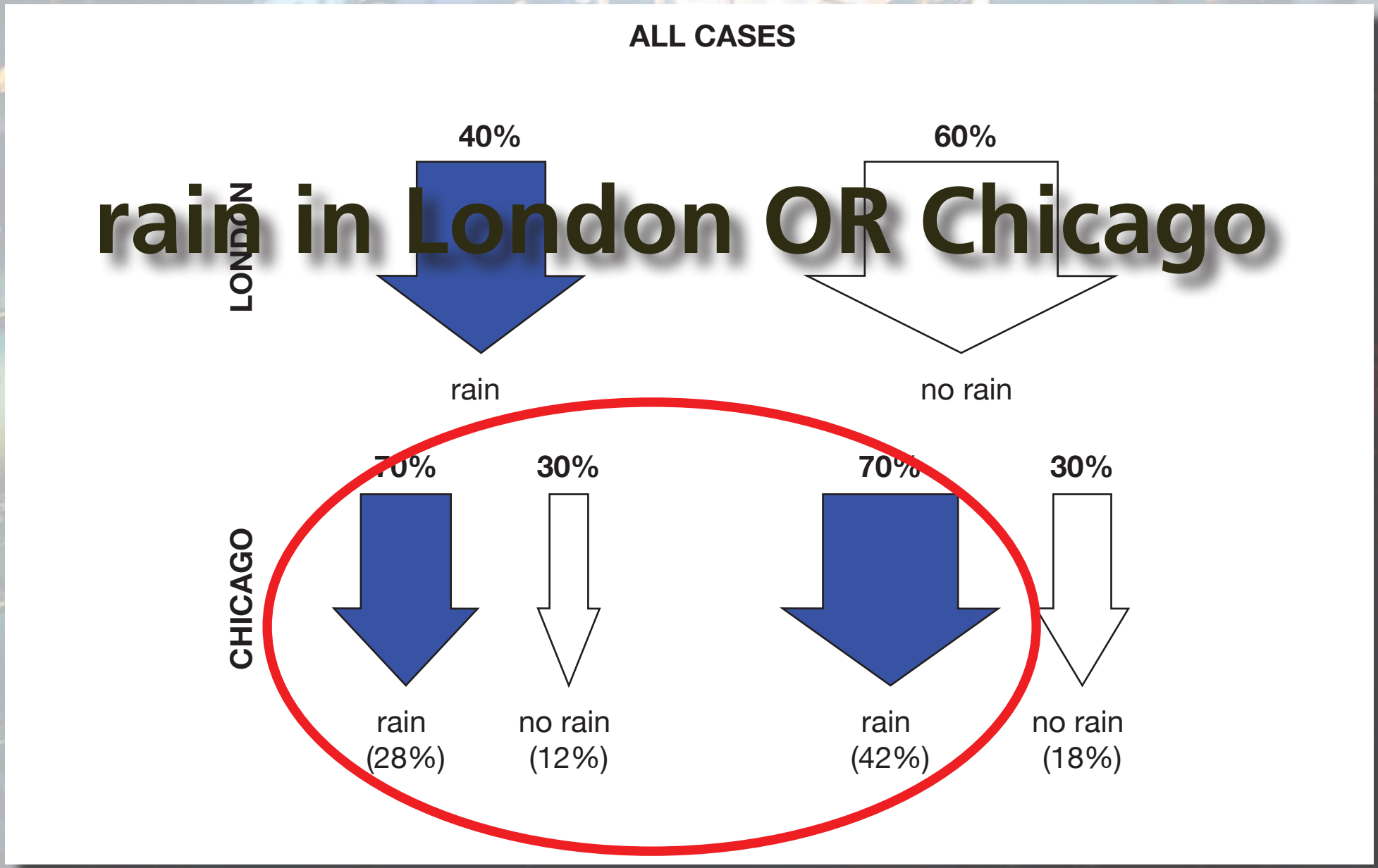

ALL CASES
rain in London AND Chicago
LONDON
40%
60%
rain
no rain
CHICAGO
70%
30%
70%
30%
rain
(28%)
no rain
(12%)
rain
(42%)
no rain
(18%)

Let's try it!


ALL CASES
40%
60%
LONDON
rain
no rain
70%
30%
CHICAGO
rain
(28%)
no rain
(12%)
rain
(42%)
no rain
(18%)
rain in London AND Chicago
28%

Let's try it!


ALL CASES
rain in London OR Chicago
LONDON
40%
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rain
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(28%)
no rain
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rain
(42%)
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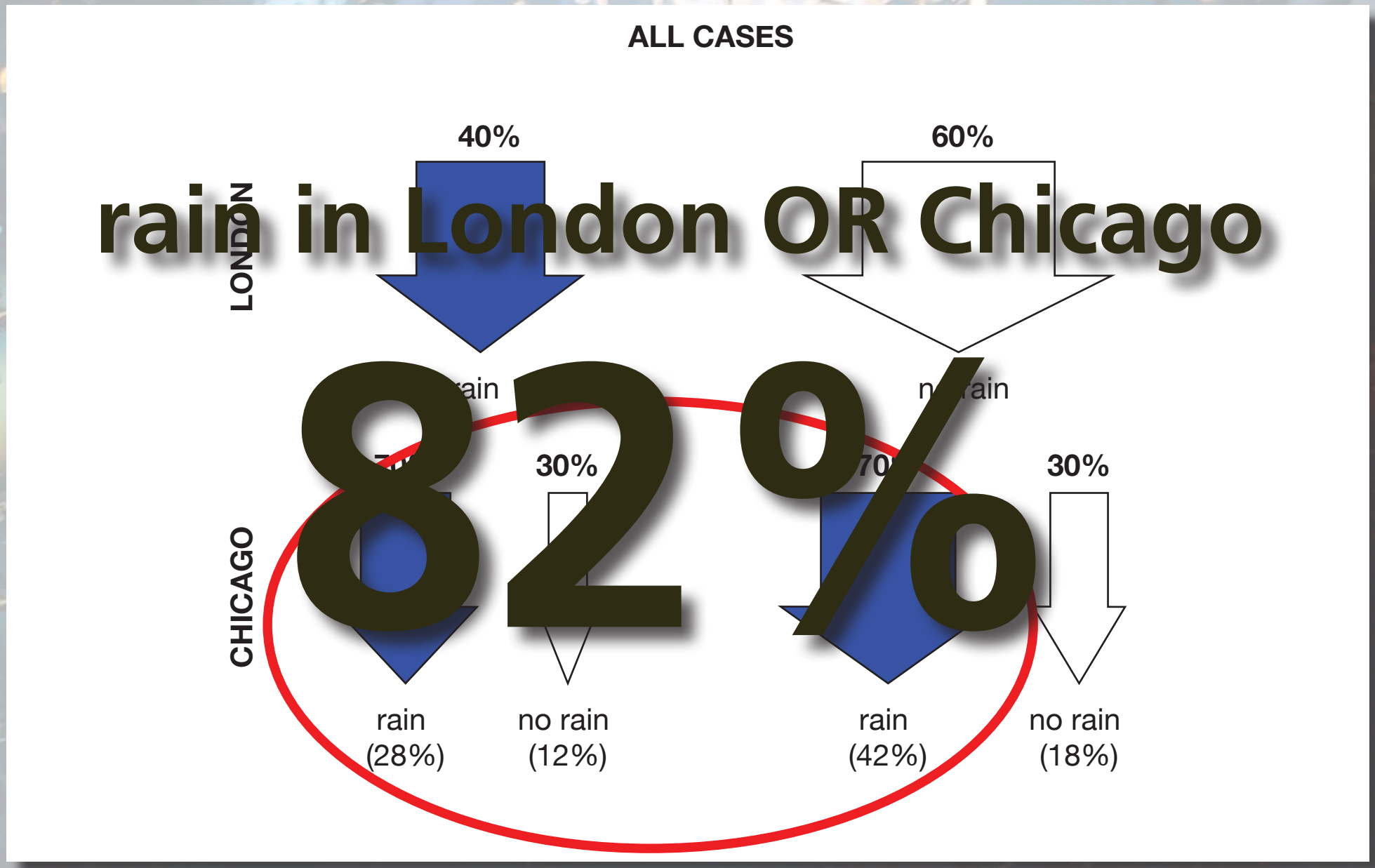
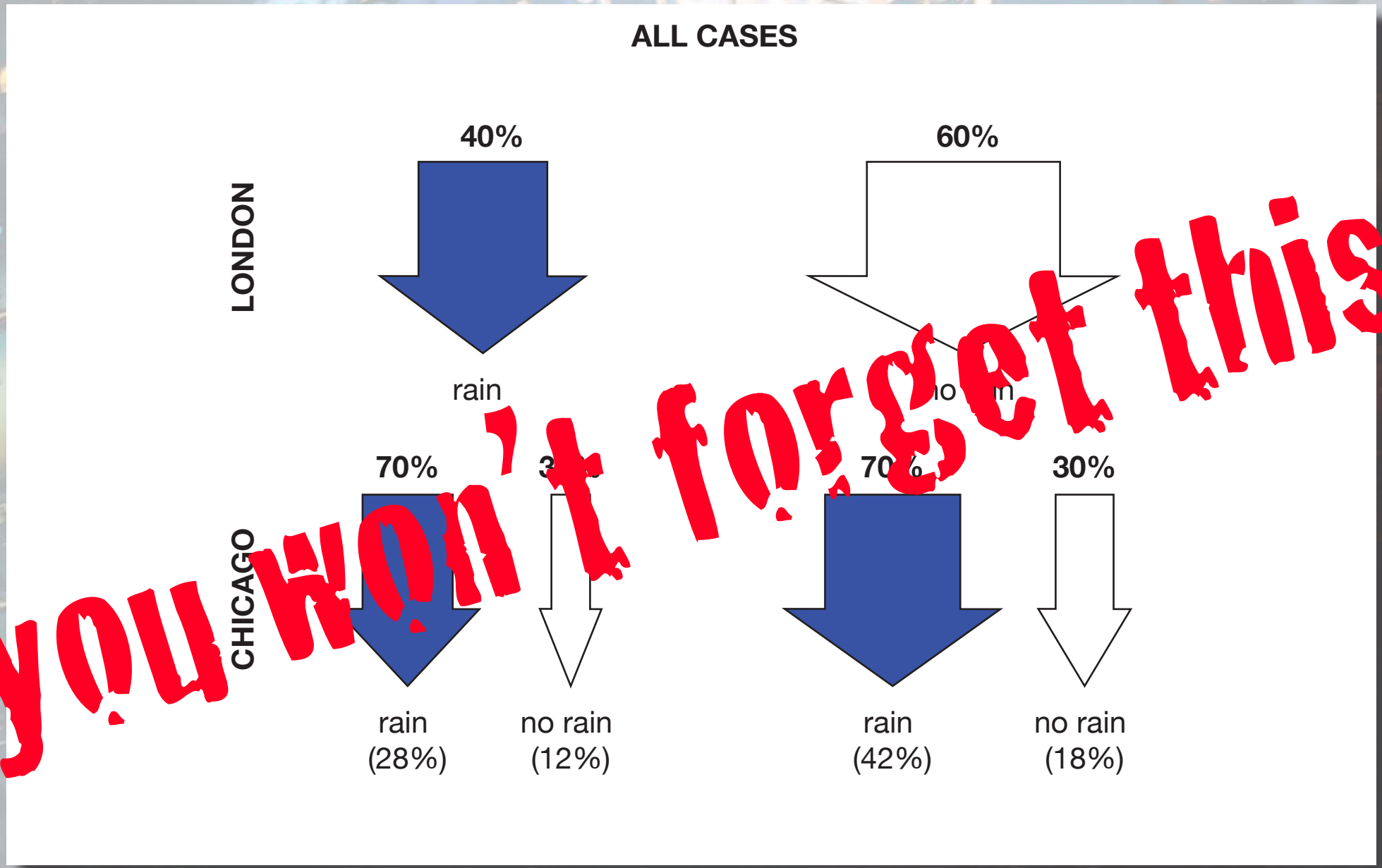
Let's try it!


ALL CASES
40%
60%
LONDON
rain
30%
70%
CHICAGO
rain
(28%)
no rain
(12%)
rain
(42%)
no rain
(18%)
rain in London OR Chicago
82%

Let's try it!



you won't forget this

PI & JiTT Overview

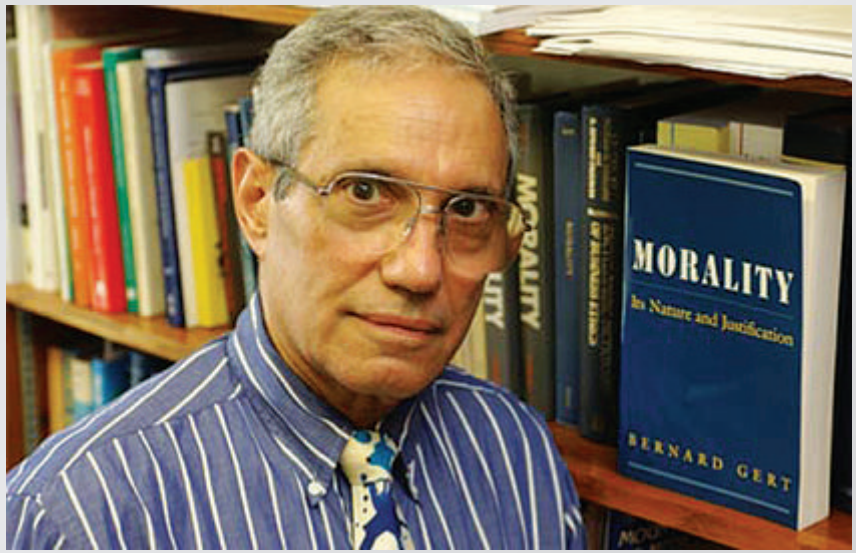
"When designing a ConcepTest

does there need to be ONE correct answer?

(or can you use PI in a humanities class?)"

Let's try it!

Bernard Gert (1934 – 2011)

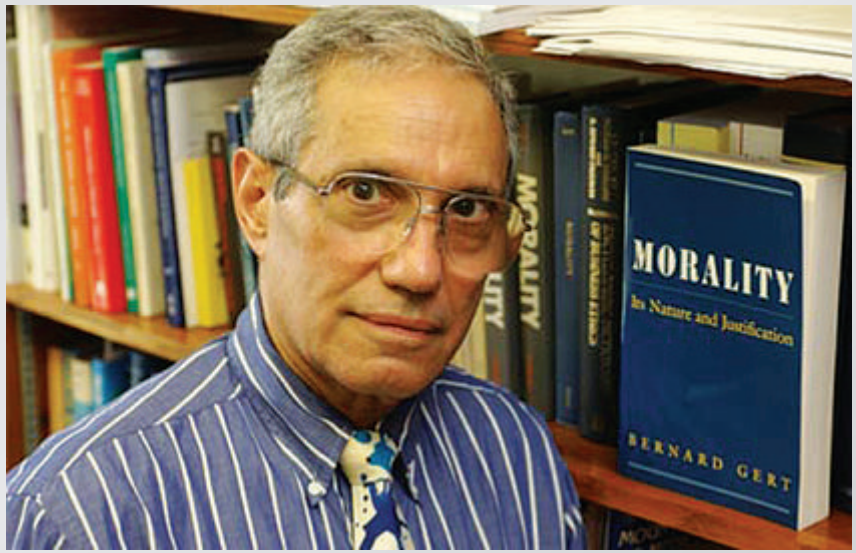


Moral philospher
Professor at Dartmouth

"Morality is an informal public system applying to all rational persons, governing behavior that affects others, and includes what are commonly known as the moral rules, ideals, and virtues and has the lessening of evil or harm as its goal."

Let's try it!

Bernard Gert (1934 – 2011)



Moral philospher

Professor at Dartmouth

Let's try it!

Bernard Gert's moral system created by 10 rules:

1. Do not kill
2. Do not cause pain
3. Do not disable
4. Do not deprive of freedom
5. Do not deprive of pleasure
6. Do not deceive
7. Keep your promises
8. Do not cheat
9. Obey the law
10. Do your duty (as required by job, circumstances).

Let's try it!

Heinz's wife was near death, and her only hope was a drug that had been discovered by a pharmacist who was selling it for an exorbitant price. The drug cost $20,000 to make, and the pharmacist was selling it for $200,000. Heinz could only raise $50,000 and insurance wouldn't make up the difference. He offered what he had to the pharmacist, and when his offer was rejected, Heinz said he would pay the rest later. Still the pharmacist refused. In desperation, Heinz broke into the store and stole the drug.

Let's try it!

Heinz's wife was near death, and her only hope was a drug that had been discovered by a pharmacist who was selling it for an exorbitant price. The drug cost $20,000 to make, and the pharmacist was selling it for $200,000. Heinz could only raise $50,000 and insurance wouldn't make up the difference. He offered what he had to the pharmacist, and when his offer was rejected, Heinz said he would pay the rest later. Still the pharmacist refused. In desperation, Heinz broke into the store and stole the drug.

Should Heinz have broken into the store to steal the drug for his wife?

Let's try it!

Bernard Gert's moral system created by 10 rules:

1. Do not kill
2. Do not cause pain
3. Do not disable
4. Do not deprive of freedom
5. Do not deprive of pleasure
6. Do not deceive
7. Keep your promises
8. Do not cheat
9. Obey the law
10. Do your duty (as required by job, circumstances).

Let's try it!

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Should Heinz have broken into the store to steal the drug for his wife?

1. Yes
2. No

Let's try it!

Bernard Gert's moral system created by 10 rules:

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8. Do not cheat
9. Obey the law
10. Do your duty (as required by job, circumstances).

Should Heinz have broken into the store to steal the drug for his wife?

1. Yes
2. No

you got all engaged!

PI & JiTT Overview

Don’t need a correct answer!

PI & JiTT Overview

Benefits:

- helps develop conceptual models
- solidifies understanding
- provides feedback
- empowers students

Outline

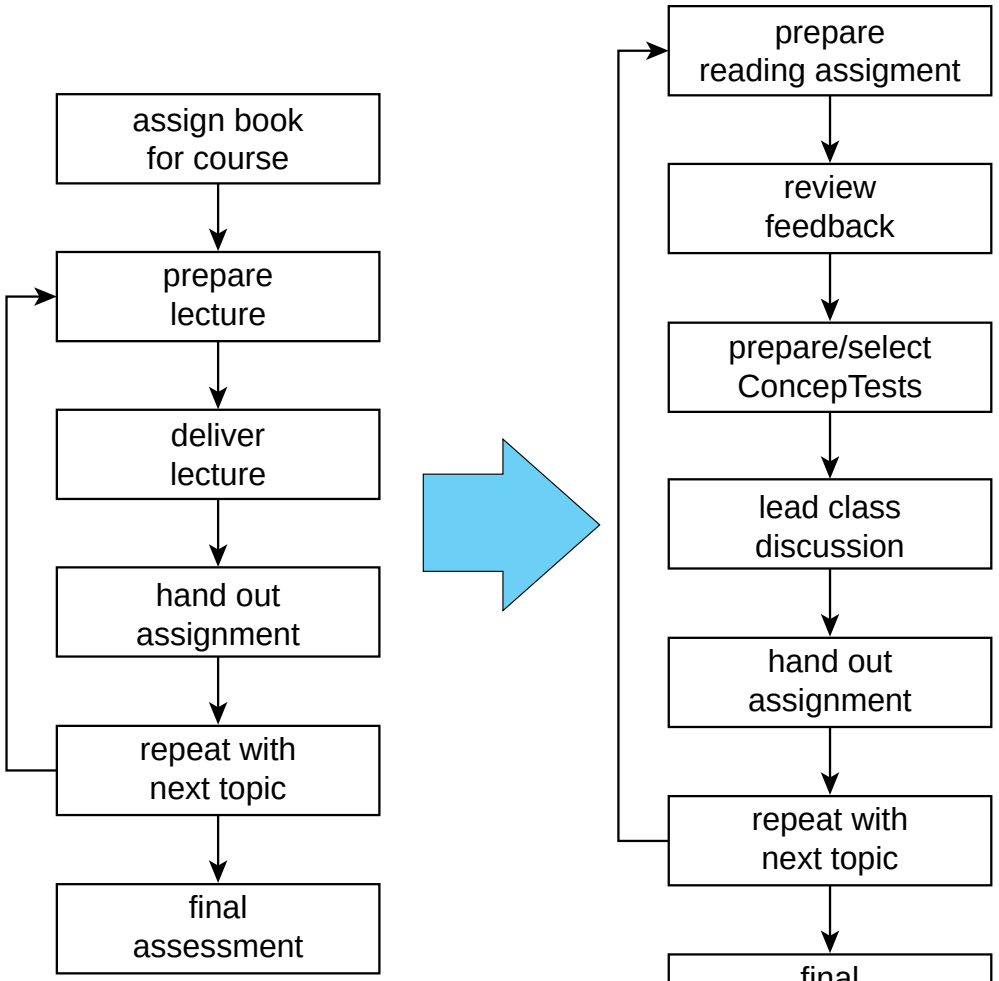
- PI & JiTT Overview
- **Implementing PI & JiTT**
- ConcepTests

Implementing PI & JiTT

“How much extra time is needed to prepare for PI?”

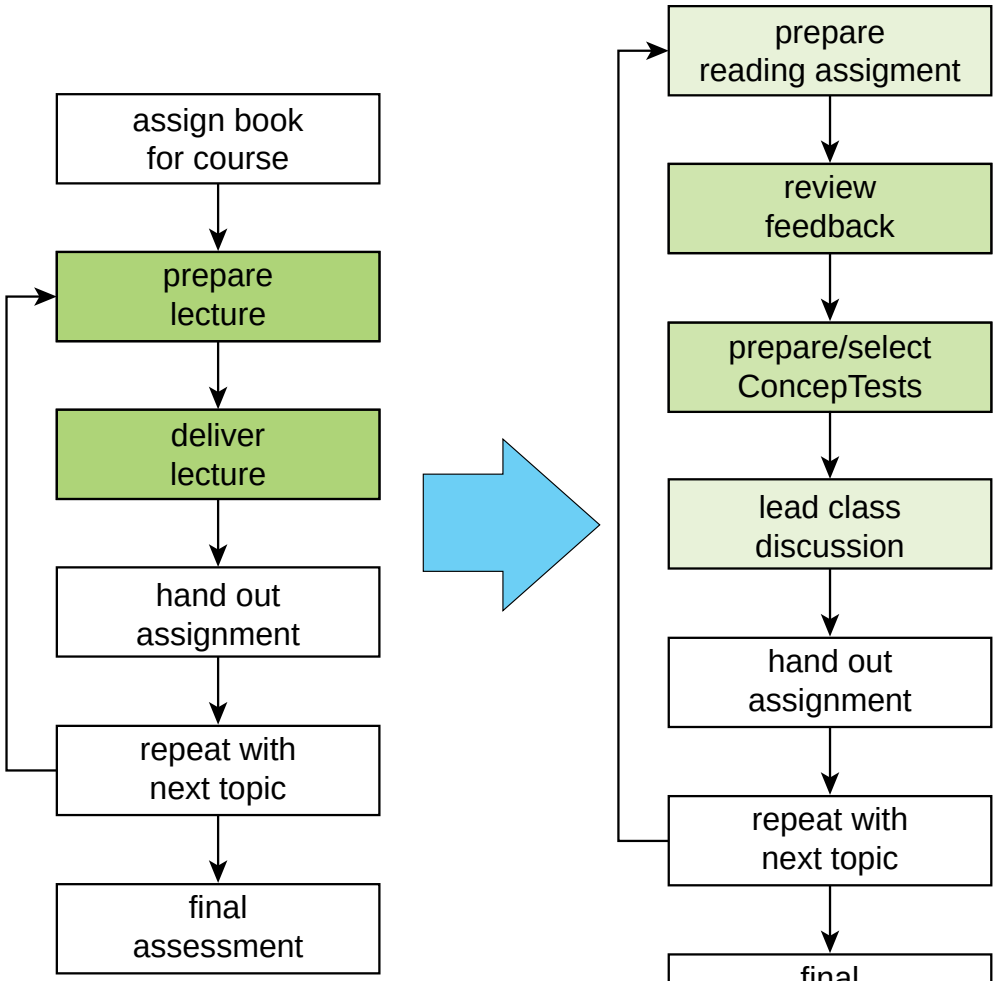
Implementing PI & JiTT

transitioning: where does the effort go?



Implementing PI & JiTT

transitioning: where does the effort go?



Implementing PI & JiTT

New activities:

1. Reading assignment
2. ConcepTests

Implementing PI & JiTT

“How do I make sure all topics can be covered using this method?”

Outline

- PI & JiTT Overview
- Implementing PI & JiTT
- ConcepTests

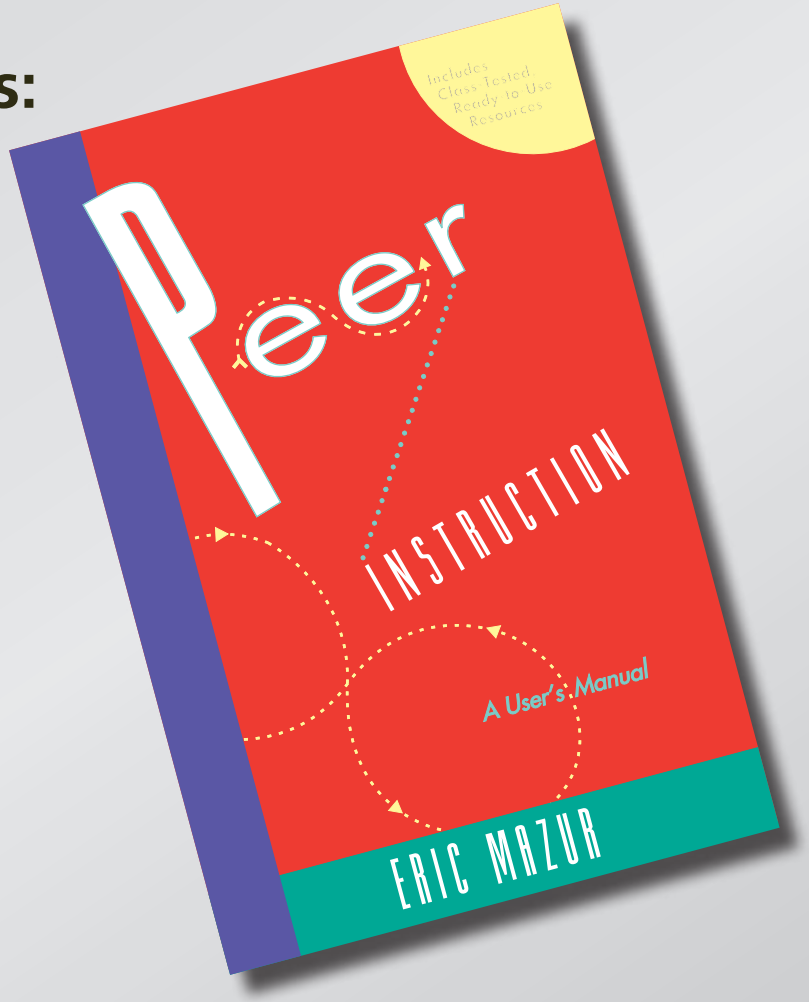
ConcepTests

"How do I get examples of good questions?"

ConcepTests

Books with ConcepTests:

- **Physics (Prentice Hall)**



ConcepTests

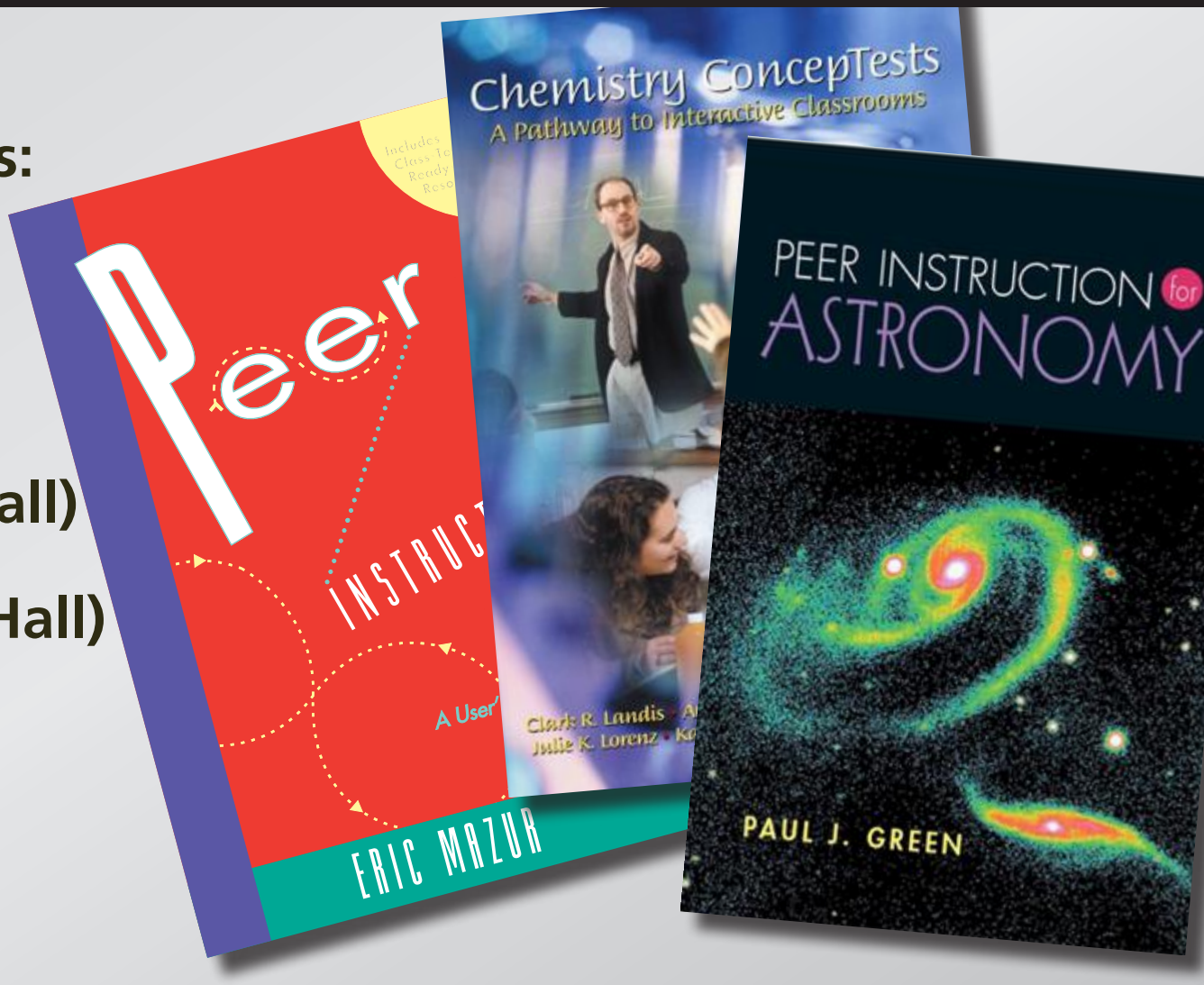
Books with ConcepTests:

- **Physics (Prentice Hall)**
- **Chemistry (Prentice Hall)**

ConcepTests

Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)



ConcepTests

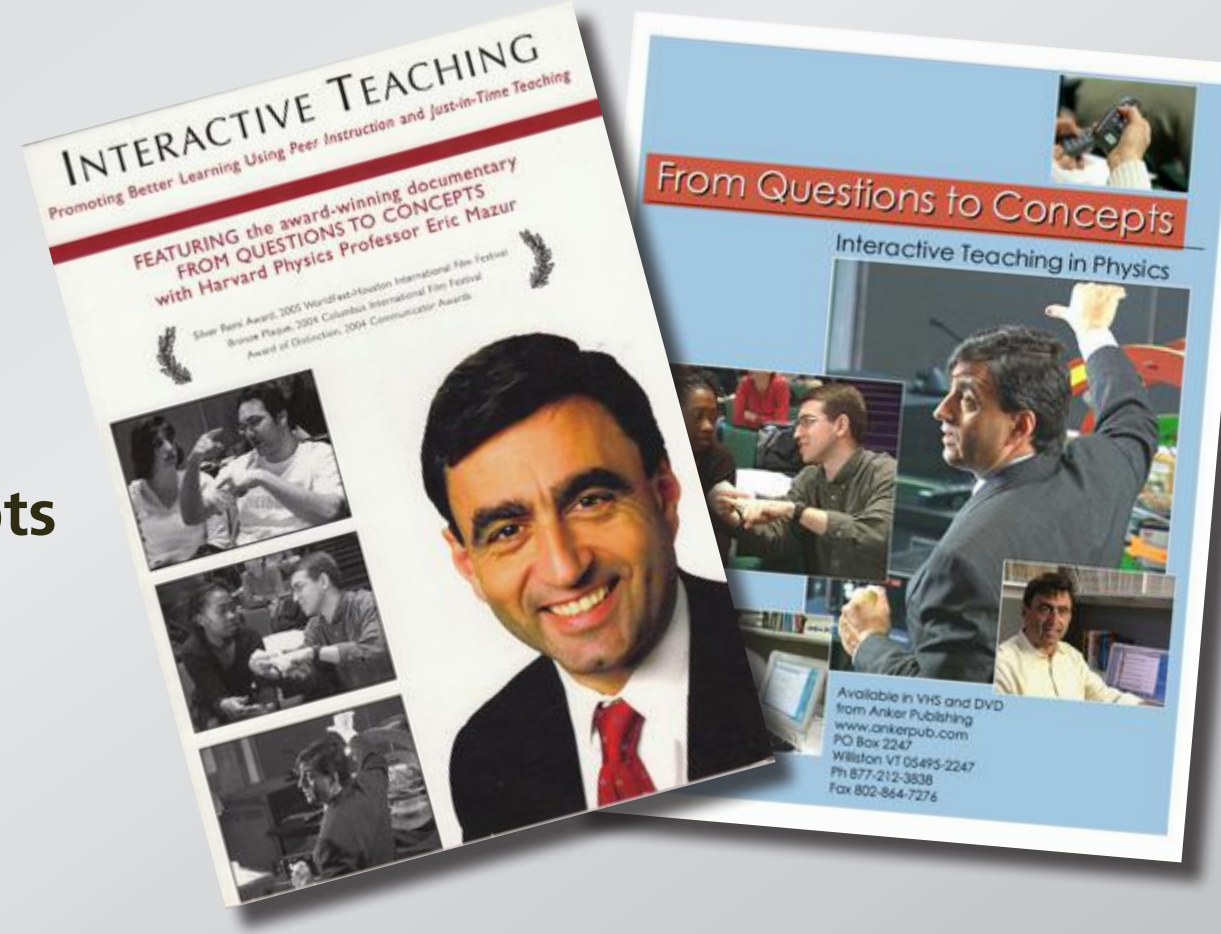
Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)
- Calculus (Wiley)

ConcepTests

Videos:

- Interactive Teaching DVD
- From questions to concepts



ConcepTests

Google:

<your discipline> ConcepTest

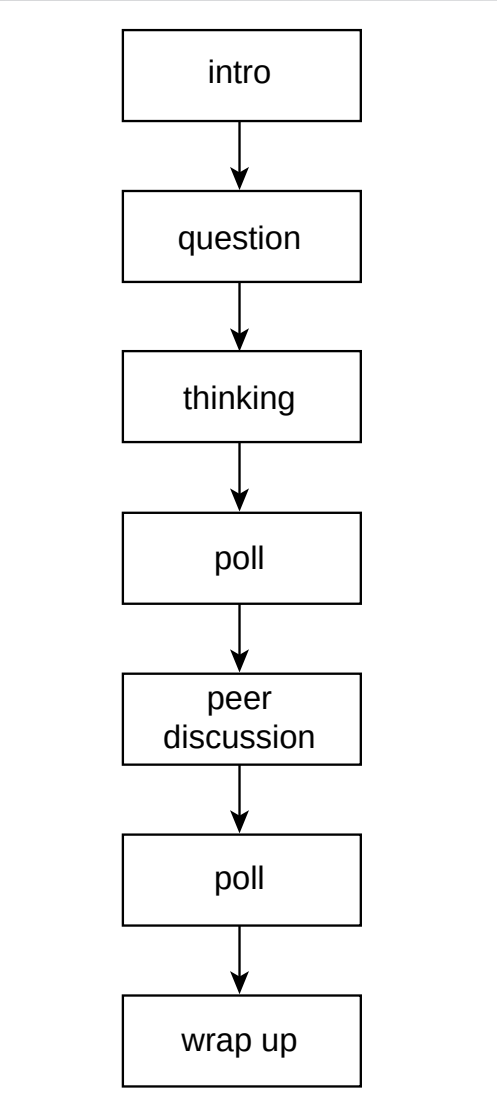
<your discipline> “Concept Test”

<your discipline> “Peer Instruction”

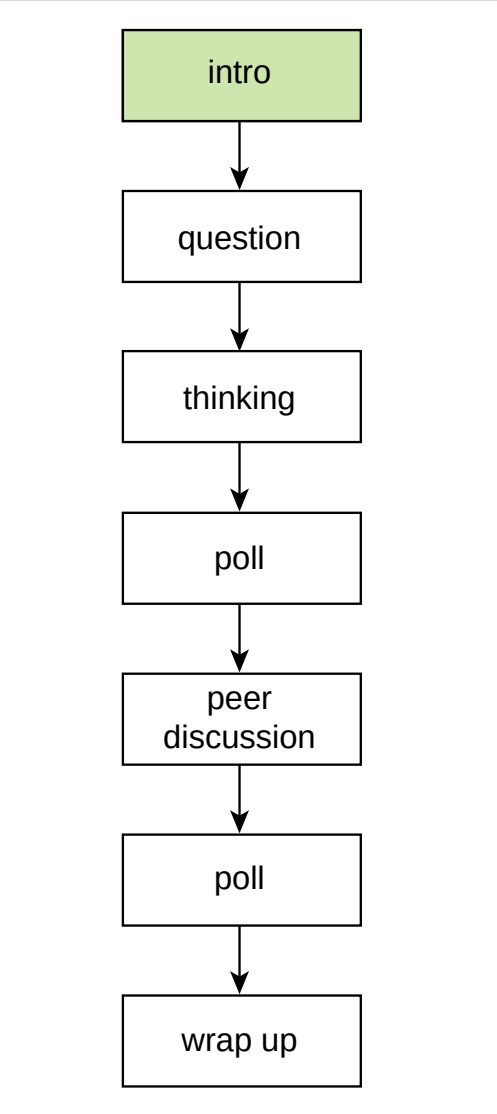
ConcepTests

"What are the important parts of a ConcepTest?"

ConcepTests

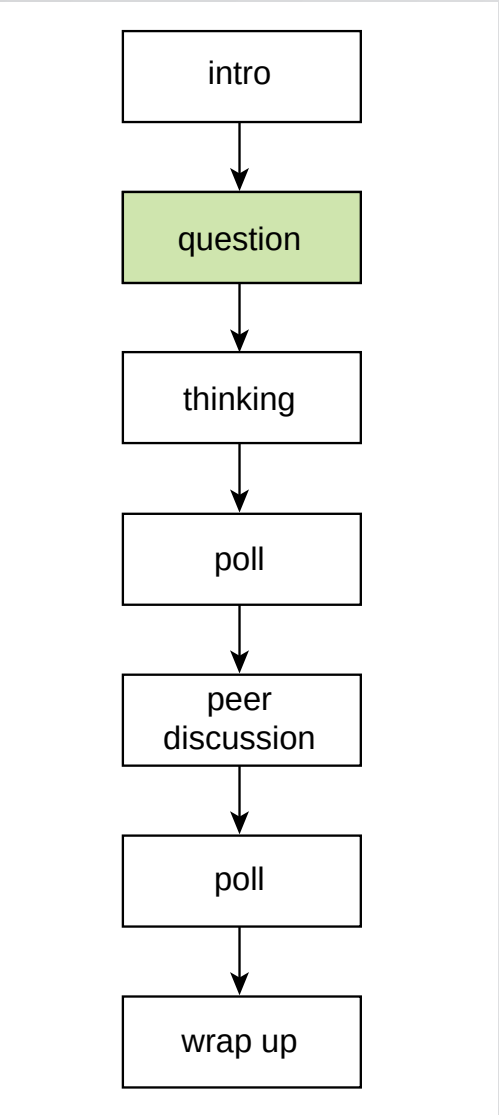


ConcepTests



setting context

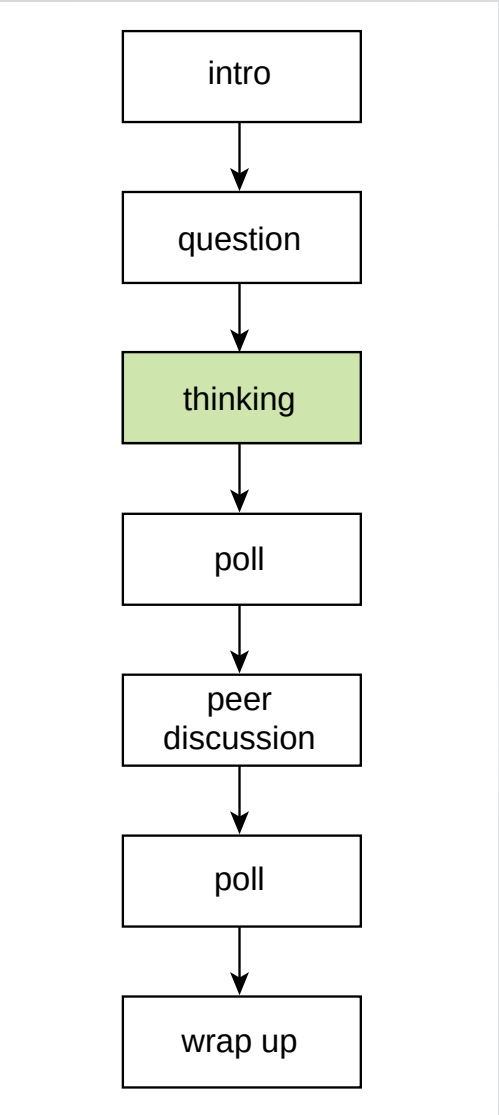
ConcepTests



setting context

posing question

ConcepTests

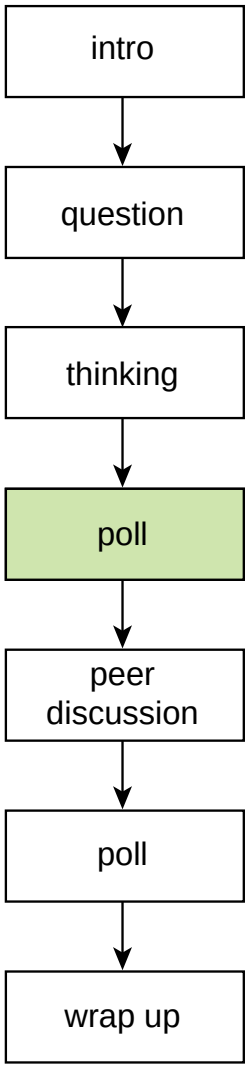


setting context

posing question

reflection

ConcepTests



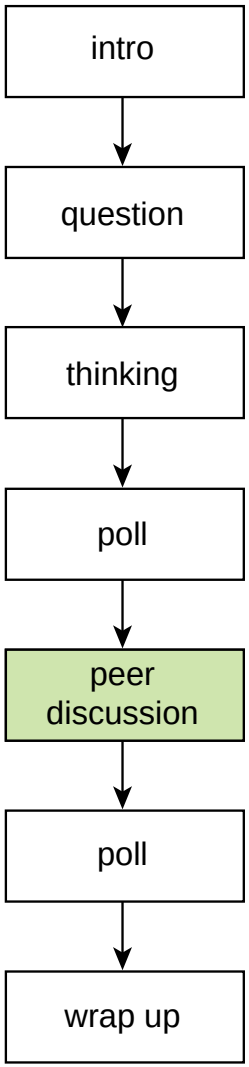
setting context

posing question

reflection

baseline data

ConcepTests



setting context

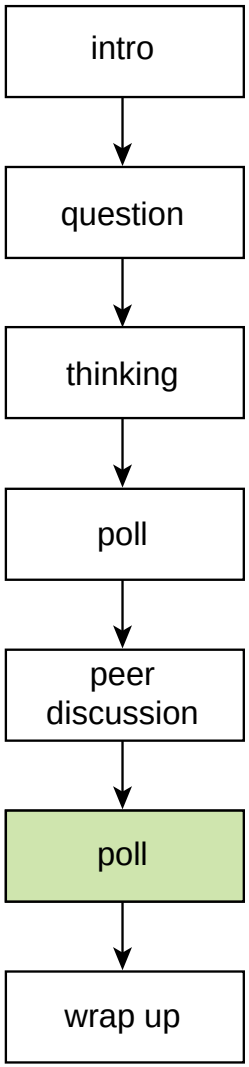
posing question

reflection

baseline data

peer instruction

ConcepTests



setting context

posing question

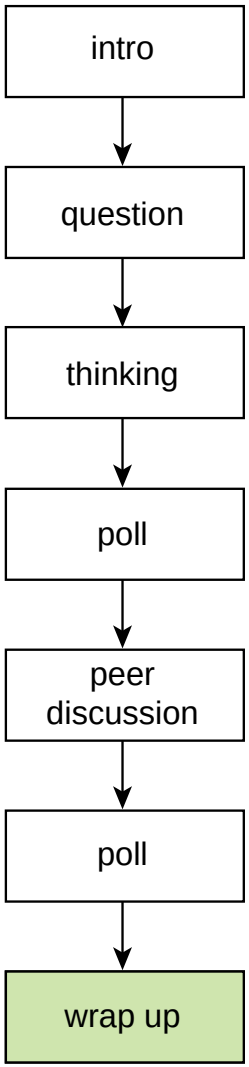
reflection

baseline data

peer instruction

gain data

ConcepTests



setting context

posing question

reflection

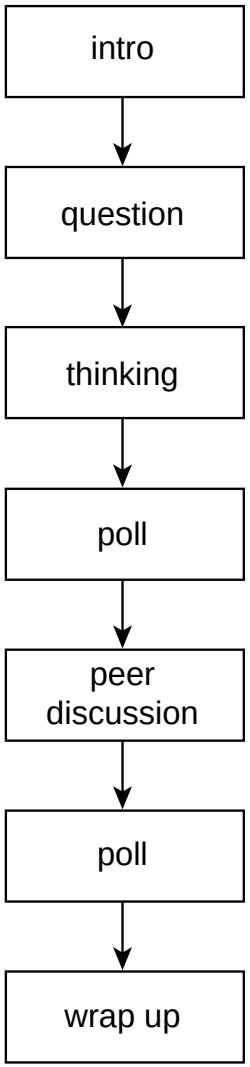
baseline data

peer instruction

gain data

closure

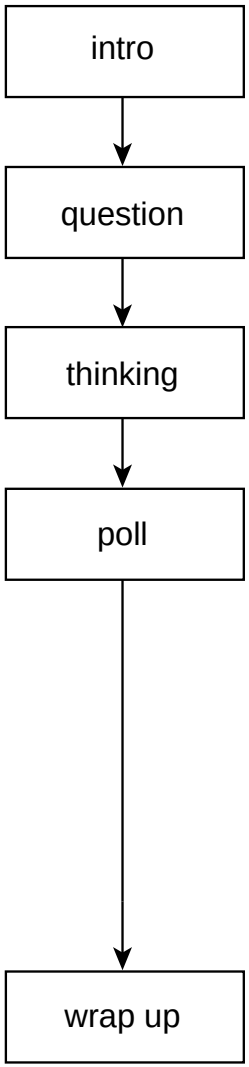
ConcepTests



setting context	5 min (max)
posing question	1 min
reflection	1–2 min
baseline data	
peer instruction	2–3 min
gain data	
closure	5 min (max)

ConcepTests

potential shortcuts

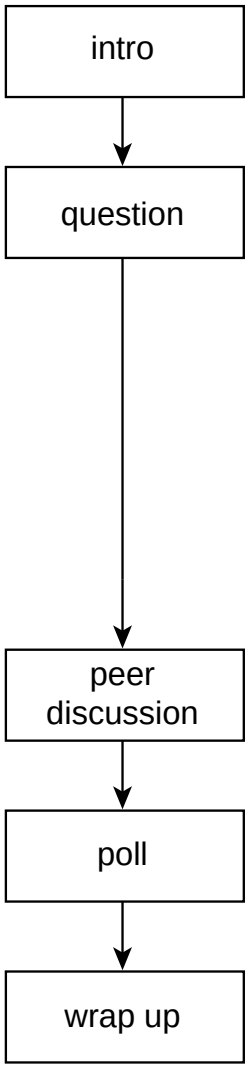


2–3 min saved, but…

takes the “Peer” out of “Peer Instruction”

ConcepTests

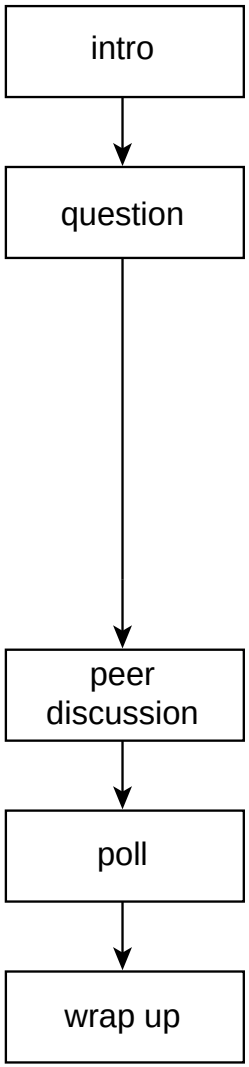
potential shortcuts



launch straight into discussion?

ConcepTests

potential shortcuts

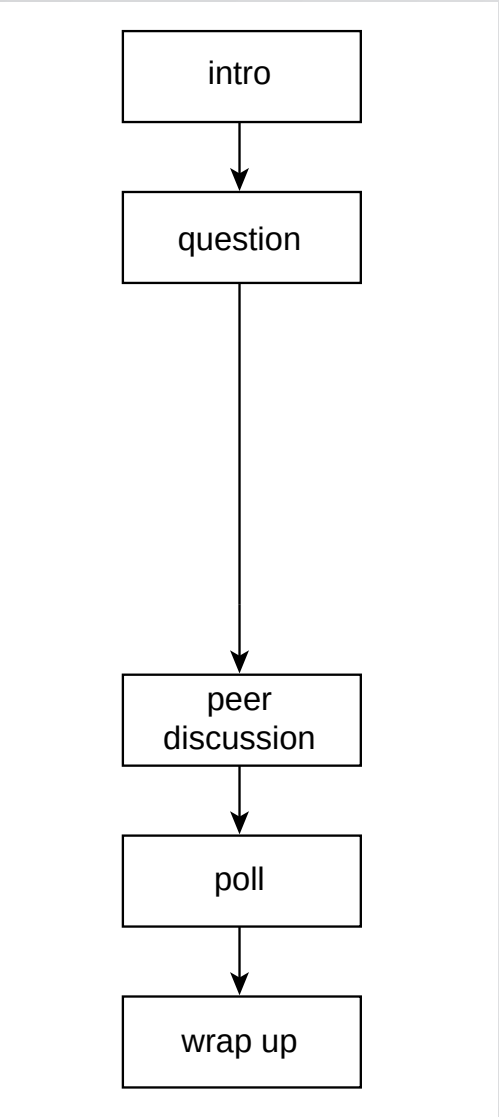


1–2 min saved, but…

no opportunity to commit before discussion

ConcepTests

potential shortcuts



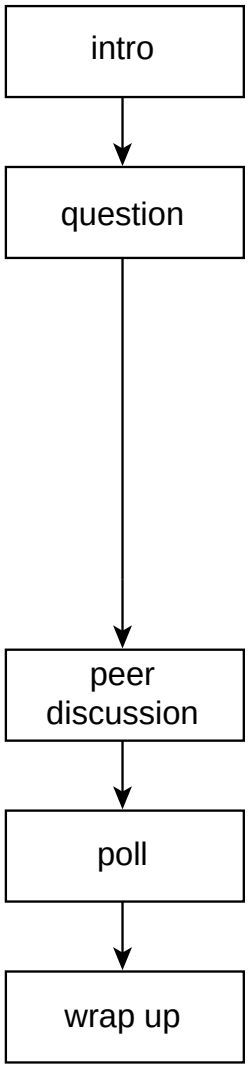
1–2 min saved, but…

no opportunity to commit before discussion

Boyle, *et. al*, Studies in Higher Education, 28, 4 (2003) 457

ConcepTests

potential shortcuts



1–2 min saved, but…

no opportunity to commit before discussion

(and no information on effectiveness of CT!)

ConcepTests

"How much time do you allocate in a two-hour lecture for the use of Peer Instruction?"

ConcepTests

should count on about 15 min per ConcepTest

ConcepTests

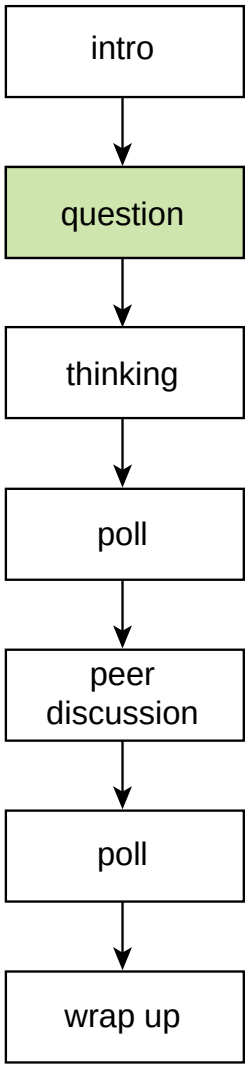
should count on about 15 min per ConcepTest

(including two pollings)

ConcepTests

"What are the main characteristics of a good ConcepTest?"

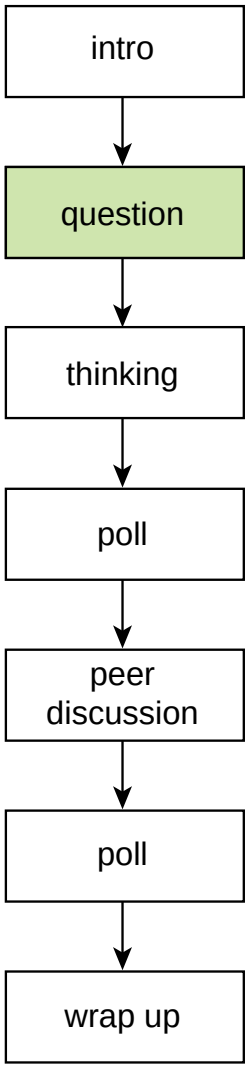
ConcepTests



An effective ConcepTest…

- is driven by student needs
- tests understanding, not memorization
- pushes students (but not too much)

ConcepTests



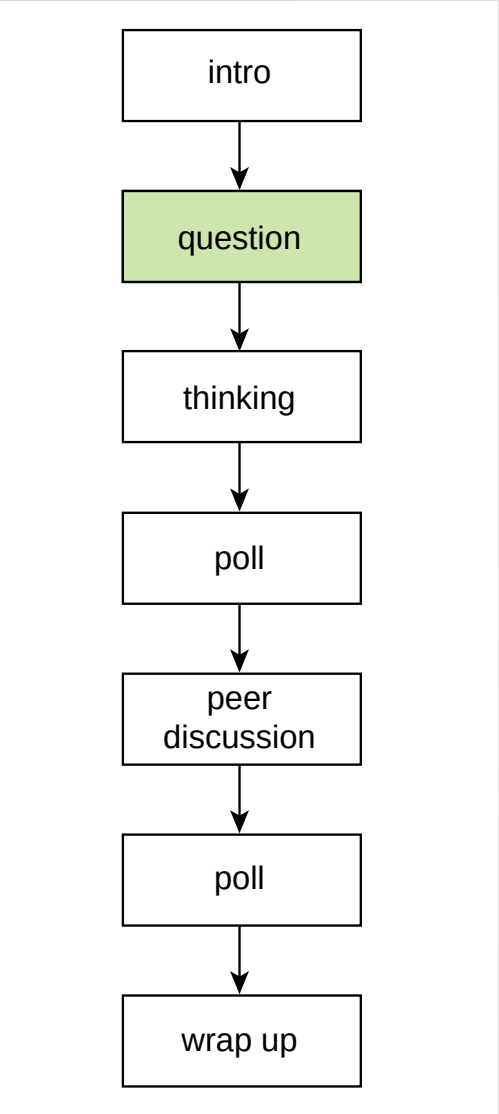
Sources of ConcepTests:

- literature/web (you'd be surprised!)
- pre-class assignments
- other assignments

ConcepTests

“With this method, can I use only multiple choice questions?”

ConcepTests



You can start with free response questions!

Outline

- PI & JiTT Overview
- Implementing PI & JiTT
- ConcepTests

In closing…

"Experience from those who have used PI?
Anyone from Accounting?"

In closing…

"Experience from those who have used PI? Anyone from Accounting?"

"Are there any institutions in Hong Kong that use PI for teaching?"


Join now!
PeerInstruction.net

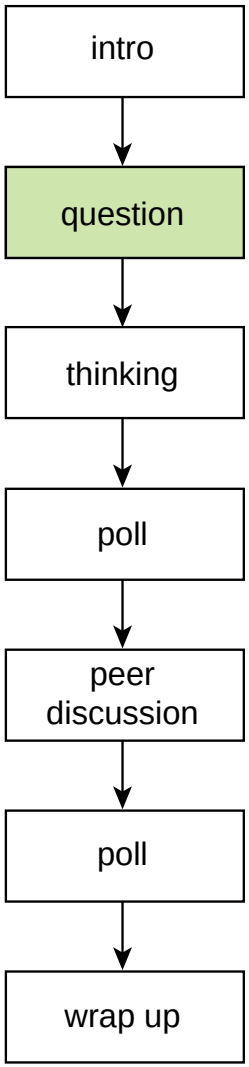
Assignment

To do before next online session:

1. learn more about Peer Instruction
2. identify resources/ConcepTests in your discipline
3. find PI Users in your discipline
4. review & score ConcepTests
5. create a ConcepTest in your field (optional)

Assignment

To create **YOUR** ConcepTests, you need…



1. context

2. question

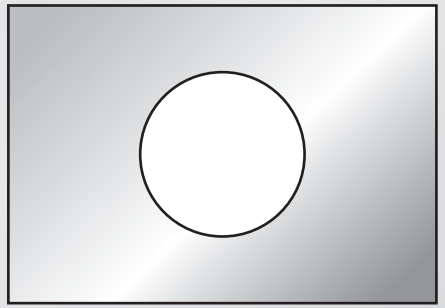
3. closure

Assignment

When metals heat up, they expand because all atoms get farther away from each other.

Assignment

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



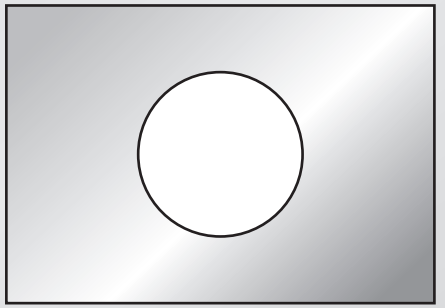
When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

QUESTION

Assignment

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



stem

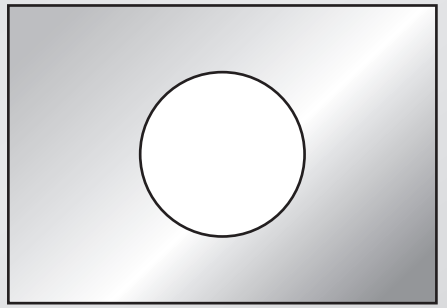
When the plate is uniformly heated, the diameter of the hole

QUESTION

1. increases.
2. stays the same.
3. decreases.

Assignment

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



stem

When the plate is uniformly heated, the diameter of the hole

choices

1. increases.
2. stays the same.
3. decreases.

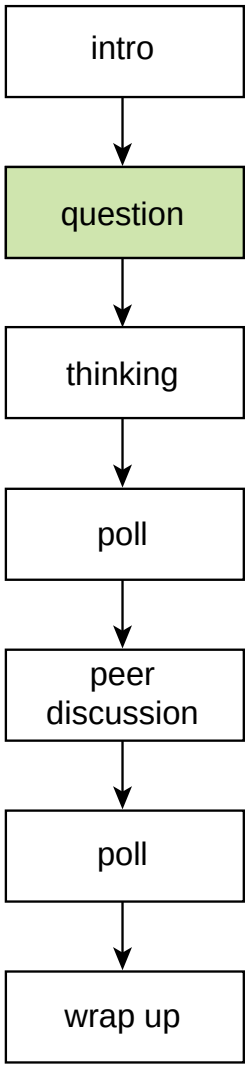
QUESTION

Assignment

consider the atoms at the rim of the hole

Assignment

to create **YOUR** ConcepTests, you need…



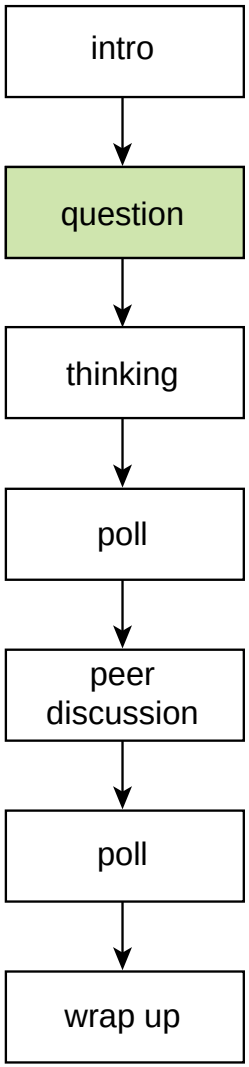
1. context

2. question

3. closure

Assignment

some basic design rules

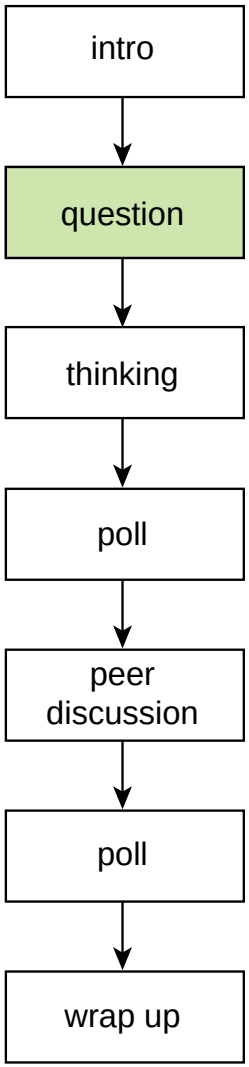


General tips:

- focus on one idea/concept/model
- keep questions concise
- define all terms
- keep vocabulary simple

Assignment

some basic design rules

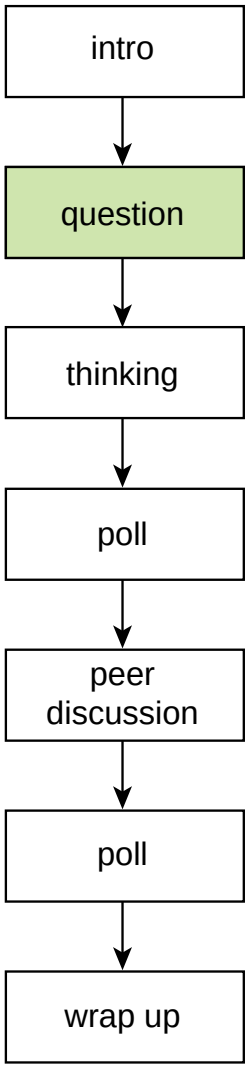


Remove:

- **barriers for knowledgeable students**
- **clues for less-knowledgeable students**

Assignment

some basic design rules

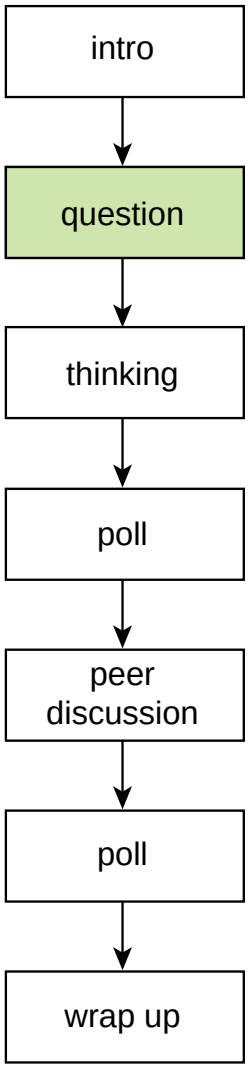


Writing good “stems”:

- **ask complete question**
- **avoid common knowledge**
- **avoid negative statements (“not”, “no”,…)**

Assignment

some basic design rules

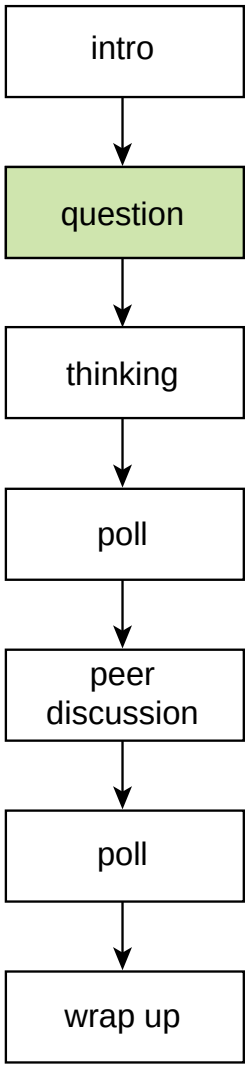


Writing good answer choices:

- aim for 3–5 options
- order choices logically
- make all roughly same length
- avoid repeating words (move to stem)
- avoid “All/None of the above”, “Other”

Assignment

Example: a nonsense question



Choose most likely correct answer, based on what you know about informed guessing on tests.

Under what circumstances do *ermazoa* coagulate?

A. Only when *jushespora* increase.

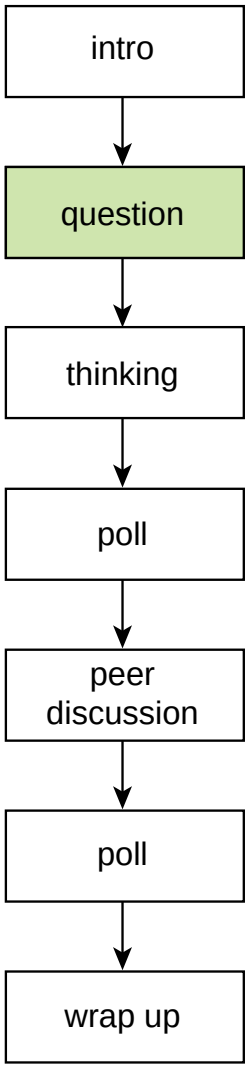
B. Only when *jushespora* change color.

C. When *jushespora* draw into a circle.

D. Usually when *jushespora* increase, but occasionally when *jushespora* decrease.

Assignment

Example: another nonsense question



What is the color of *ermazoa*?

A. Blue.

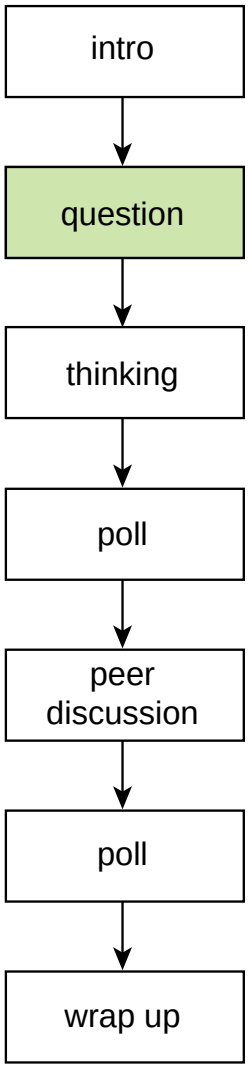
B. Red.

C. Green.

D. Yellow.

Assignment

Example: a well-crafted question



Which statement refers to measurement as opposed to evaluation?

A. Emily got 90% correct on her math quiz.

B. Mary's test scores have increased satisfactorily this year.

C. Paul's score of 20 on this test indicates that his study habits are ineffective.

D. Linda received a B+ for her art project.

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http://mazur.harvard.edu

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