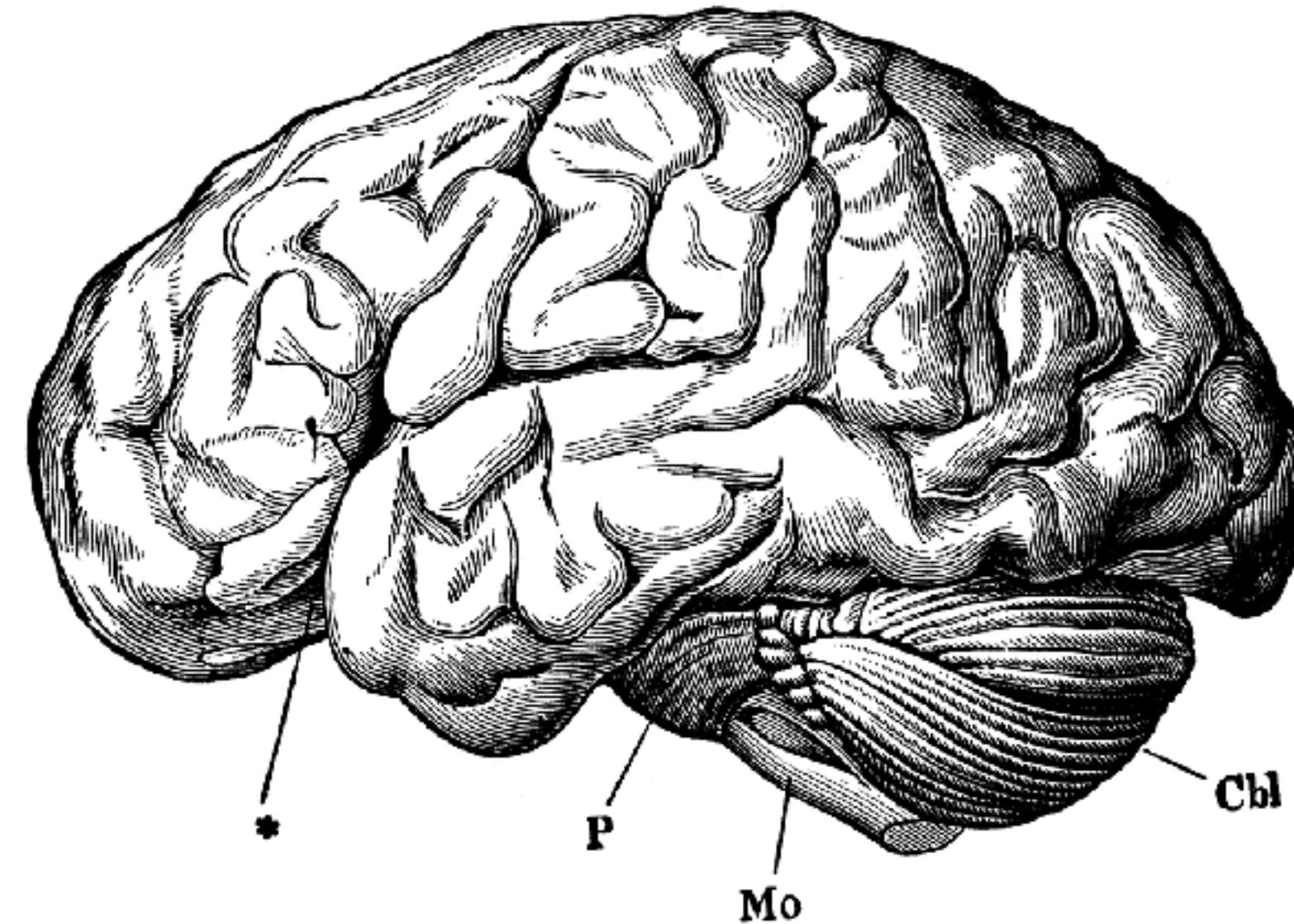


Teach the Tidyverse (and anything else)



Garrett Grolemund

Data Scientist, Educator

January 2018

RStudio

Warm Up

Form groups of four people. Get to know each other. Decide:

1. What could the slide below say about R?



05 : 00

HELLO
my name is

Garrett



@StatGarrett

HELLO
my name is

Mara



@dataandme

HELLO
my name is

Kirill



@krlmlr

O-Introduction



What is a course?

What is a course?



What is a course?

- scripts by nature are incomplete
- not automatable
- requires stagecraft **teaching craft**



\$161 Billion was spent by US companies on training in 2016.

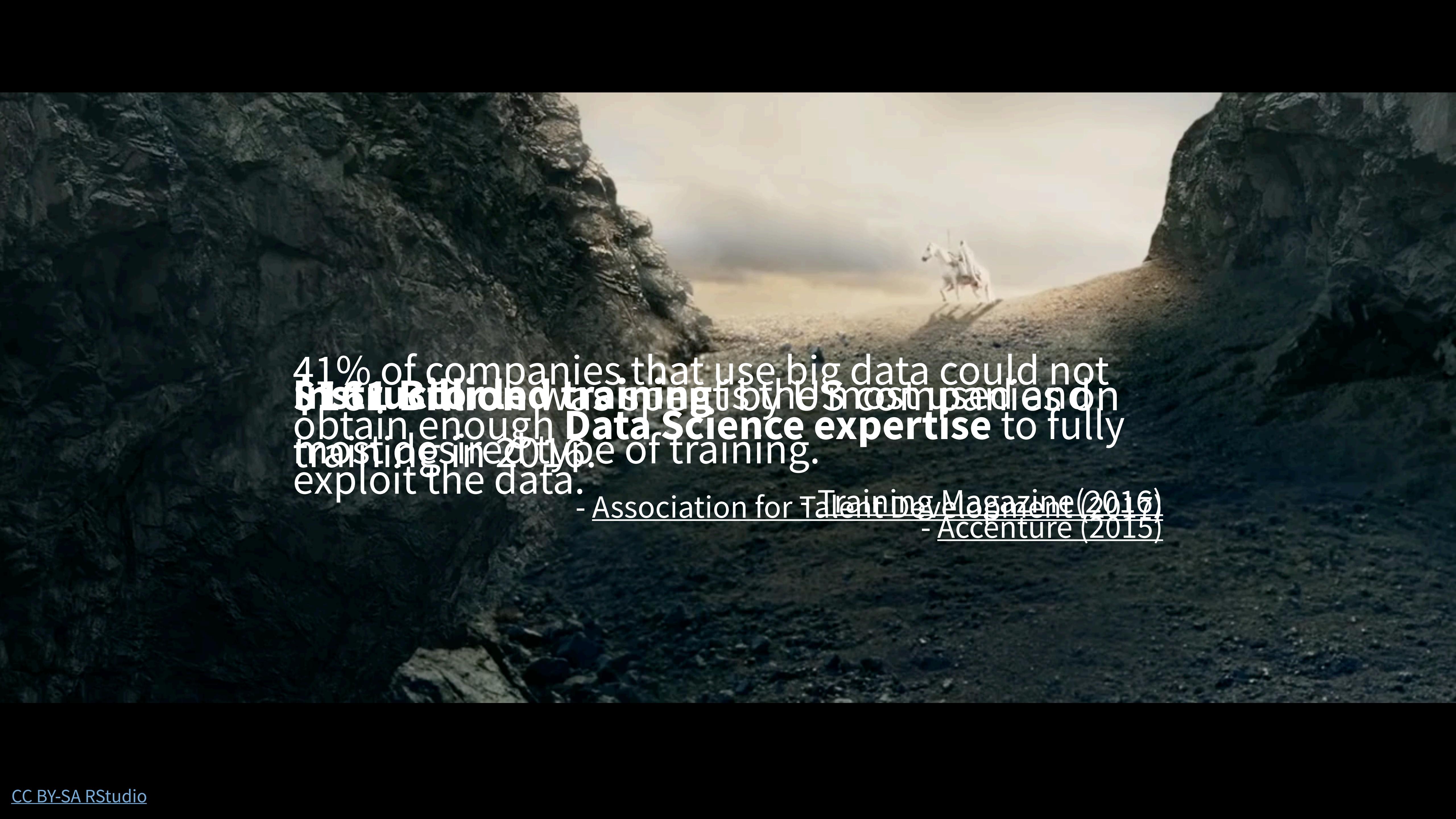
- [Training Magazine\(2016\)](#)

Instructor led training is the most used and most desired type of training.

- [Association for Talent Development \(2017\)](#)

41% of companies that use big data could not obtain enough **Data Science expertise** to fully exploit the data.

- [Accenture \(2015\)](#)



41% of companies that use big data could not
find ~~the~~ find training to the ~~the~~ needs and on
obtain enough Data Science expertise to fully
most designed type of training.
exploit the data.

- Association for Training Development (2016)

- Accenture (2015)

Day 1

9:00 - 10:30

Two Ways to Teach

Morning Break

10:45 - 12:00

How to Teach a
Workshop

Lunch

1:00 - 2:45

The Cognitive Craft

Providing R

Afternoon Break

3:00 - 5:00

Make It Clear

Make it Stick

Day 2

Their Turn

Motivating Students

Providing R

Make it Stick

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Motivating Students

How to Practice

Providing R

Make it Stick

Workshops – RStudio x Master the tidyverse – RStudio x

Garrett

Secure | https://www.rstudio.com/workshops/master-the-tidyverse/

R Studio rstudio::conf Products Resources Pricing About Us Blogs 



MASTER THE TIDYVERSE

THURSDAY, OCTOBER 5, 2017, 9 A.M. - FRIDAY, OCTOBER 6, 2017, 5 P.M.

WASHINGTON, DC

REGISTER



An introduction to R for data science

This two-day workshop covers the new book "R for Data Science" from Hadley Wickham and Garrett Grolemund. The workshop provides a comprehensive overview of what is now called the Tidyverse, a core set of R packages that are essential to Data Science. We will visualize, transform, and model data in R and work with date-times, character strings,

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CC BY-NC-SA

R Shiny Webinars

The dashboard has sections for Cheatsheets, Webinars, and Shiny Tutorials.

Garrett

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Secure https://www.rstudio.com/resources/webinars/ Garrett

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8 results for "garrett grolemund"

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- Programming Languages

Kindle Store

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- Business Software

▼ See All 3 Departments

 **R for Data Science**
IMPORT, TIDY, TRANSFORM, VISUALIZE, AND MODEL DATA
Hadley Wickham & Garrett Grolemund

 **Hands-On Programming with R**
WRITE YOUR OWN FUNCTIONS AND SIMULATIONS
Garrett Grolemund
Foreword by Hadley Wickham

R for Data Science: Import, Tidy, Transform, Visualize, and Model Data Jan 5, 2017
\$17.26 - \$18.17
prime | FREE One-Day
Paperback, Kindle Edition

Hands-On Programming with R: Write Your Own Functions and Simulations Aug 2, 2014
\$17.27 - \$33.68 prime
Paperback, Kindle Edition



Data Science Courses: R & Pyt

Secure https://www.datacamp.com/courses/q:Garrett%20Grolemund

Garrett

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Garrett Grolemund

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All Data Science Courses

 Data Manipulation in R with dplyr

Master techniques for data manipulation using the select, mutate, filter, arrange, and summarise functions in dplyr.

4 hours

 GARRETT GROLEMUND
Data Scientist at RStudio

 Joining Data in R with dplyr

This course will show you how to combine data sets with dplyr's two table verbs.

4 hours 

 GARRETT GROLEMUND
Data Scientist at RStudio

 Reporting with R Markdown

Learn to create interactive analyses and automated reports with R Markdown.

3 hours

 GARRETT GROLEMUND
Data Scientist at RStudio

 Working with the RStudio IDE (Part 1)

Learn the basics of the important features of the RStudio IDE.

 Working with the RStudio IDE (Part 2)

Further your knowledge of RStudio and learn how to integrate Git, LaTeX, and Shiny.

 Data Visualization in R with ggvis

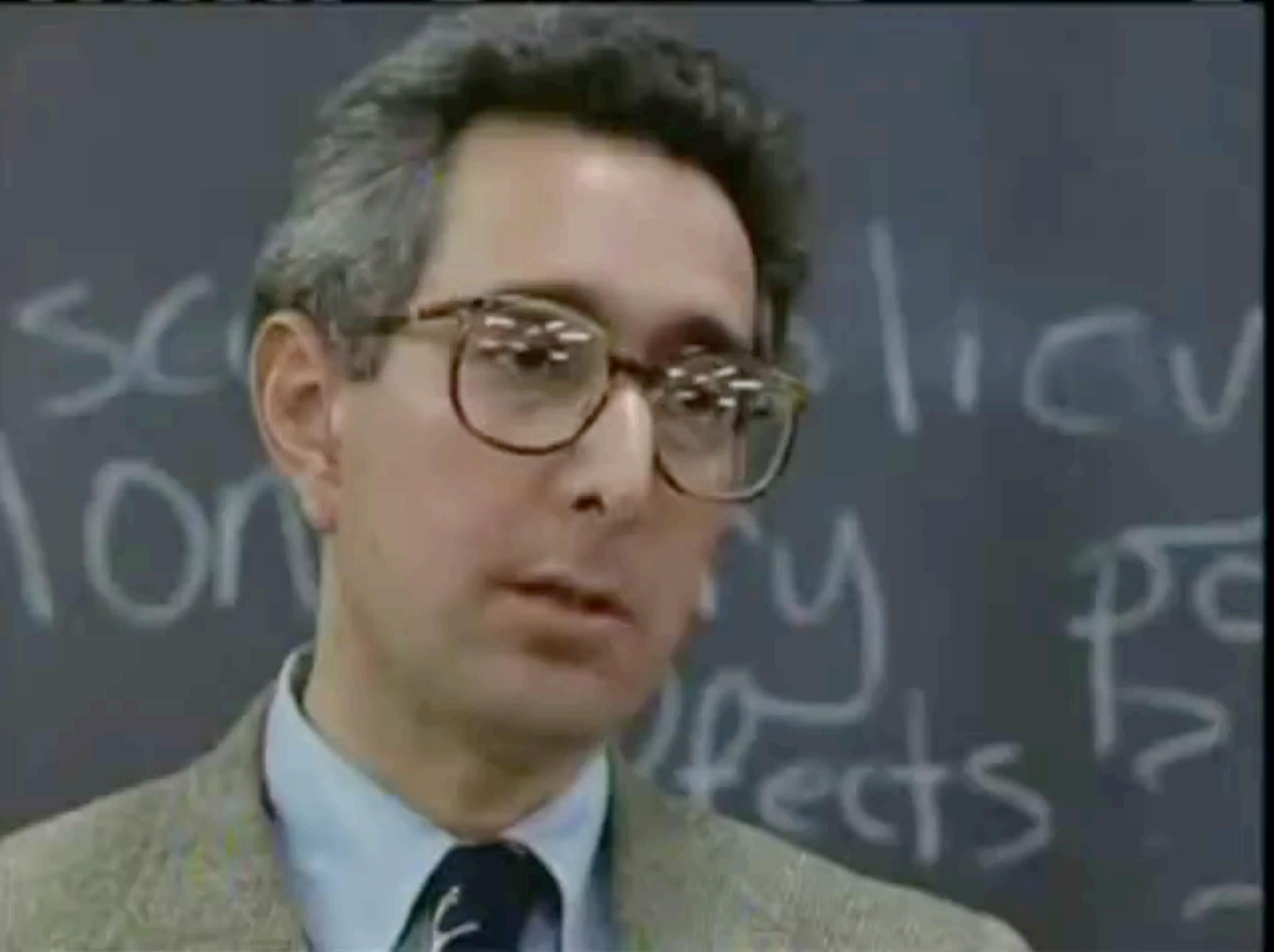
Learn to create interactive graphs to display distributions, relationships, model fits, and

Two Ways to Teach



- What is learning?
- What is the difference between good and bad teaching?
- Why is it difficult to teach in a workshop?







Day 1

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Morning Break

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Workshop

Lunch

1:00 - 2:45

The Cog
Challenge

Afternoon Break

Why is it difficult to teach
well in a workshop?

Day 2

What is learning?

What is the difference between
good and bad teaching?

Teach the Tidyverse

Your Turn

A
—
~~|||||~~

B
—
~~||||~~ |

Survey

Do you learn better when, you:

A

Read about a
function

B

Try to use the
function

Survey

Do you learn better when, you:

A

Watch a video
on DataCamp

B

Do the exercises
between the videos

Survey

Do you learn better when, you:

A

Attend a lecture

B

Discuss with an
expert

Survey

Do you learn better when, you:

A

Are told how to
solve a problem

B

Discover how to
solve a problem

Survey

Do you learn better when, you:

A

Have an idea
explained to you

B

Try to explain the
idea to someone else

Survey

Do you learn better when, you:

A

Are told how a
thing will work

B

Experience it
for yourself

Survey

Do you learn more from:

A

A long learning session that covers a lot of ground

B

Short sessions with time to try things out in between

A

Read about it **Try** it

Watch a video **Do** exercises

Attend a lecture **Discuss** with an expert

Told how to solve it **Discover** how to solve it

Told how it will work **Experience** it for yourself

Hear it explained Try to **explain** it

Passive (teacher centered)

Active (student centered)

Passive Learning

R

A

Assign reading

Play a video

Give a lecture

Tell

Tell

Tell



A

Assign reading

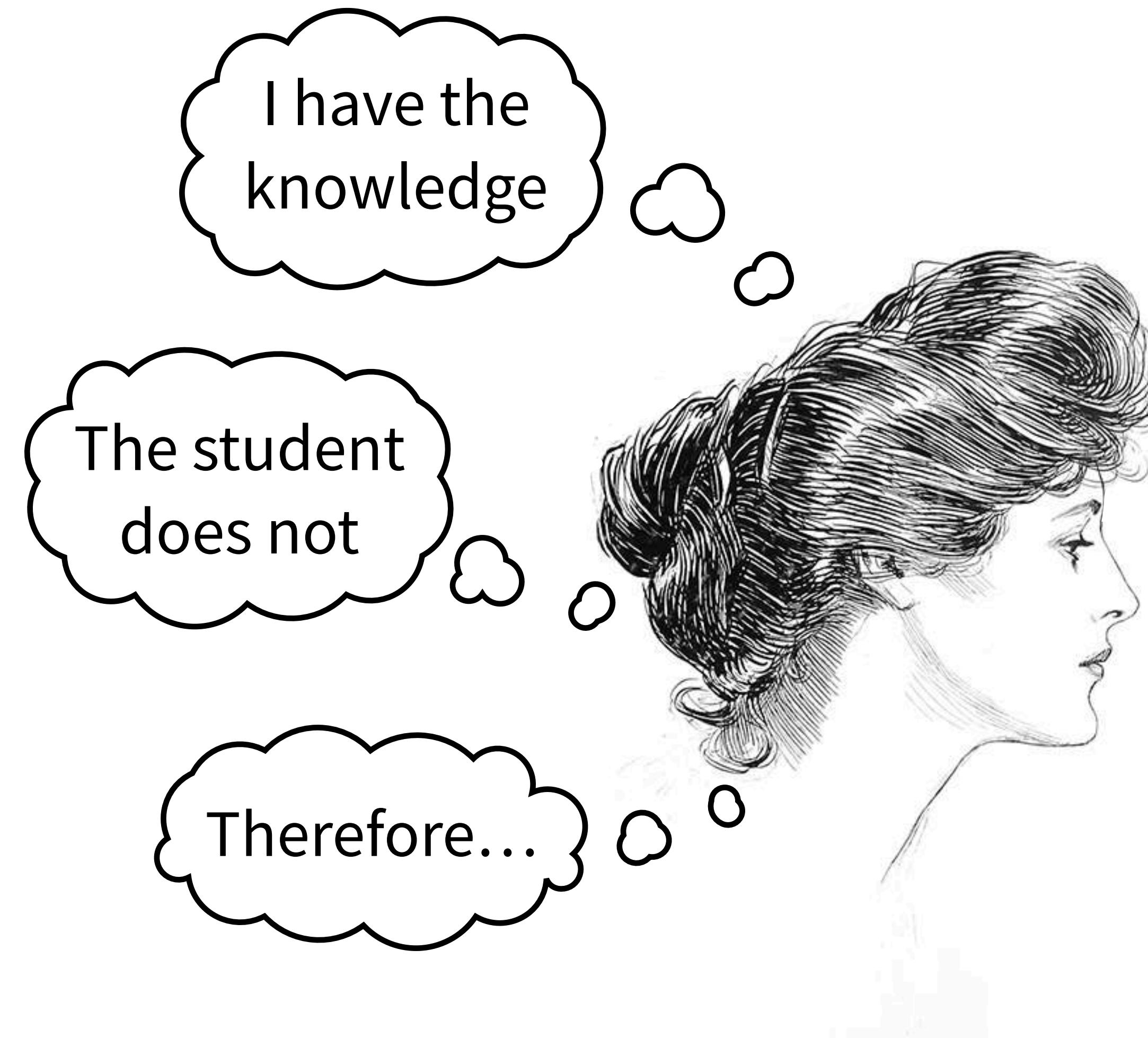
Play a video

Give a lecture

Tell

Tell

Tell



Teaching is **transmitting** knowledge

Survey

What percent of students read assigned reading?

20% to 30% of students read any given assignment when reviewing research across all subjects.

- [Hobson, E. H. \(2004\). Getting students to read: Fourteen tips \(IDEA paper 40\). Manhattan, KS: The IDEA Center.](#)

Survey

What percent of lecture content do students remember afterwards?

56% immediately after the lecture, with drop off expected as time goes on.

- Risko, E. F., Anderson, N., Sarwal, A., Engelhardt, M., & Kingstone, A. (2012). Everyday attention: variation in mind wandering and memory in a lecture. Applied Cognitive Psychology, 26(2), 234-242.

Your Turn

Does telling work?



Active Learning

R

A

Read about it	Try it
Watch a video	Do exercises
Attend a lecture	Discuss with an expert
Told how to solve it	Discover how to solve it
Told how it will work	Experience it for yourself
Hear it explained	Try to explain it
A long learning session that covers a lot of ground	Short sessions with time to try things out in between

B

Active learning is any method that requires students to:

1. do something
2. think about what they are doing

Try it

Do exercises

Discuss with an expert

Discover how to solve it

Experience it for yourself

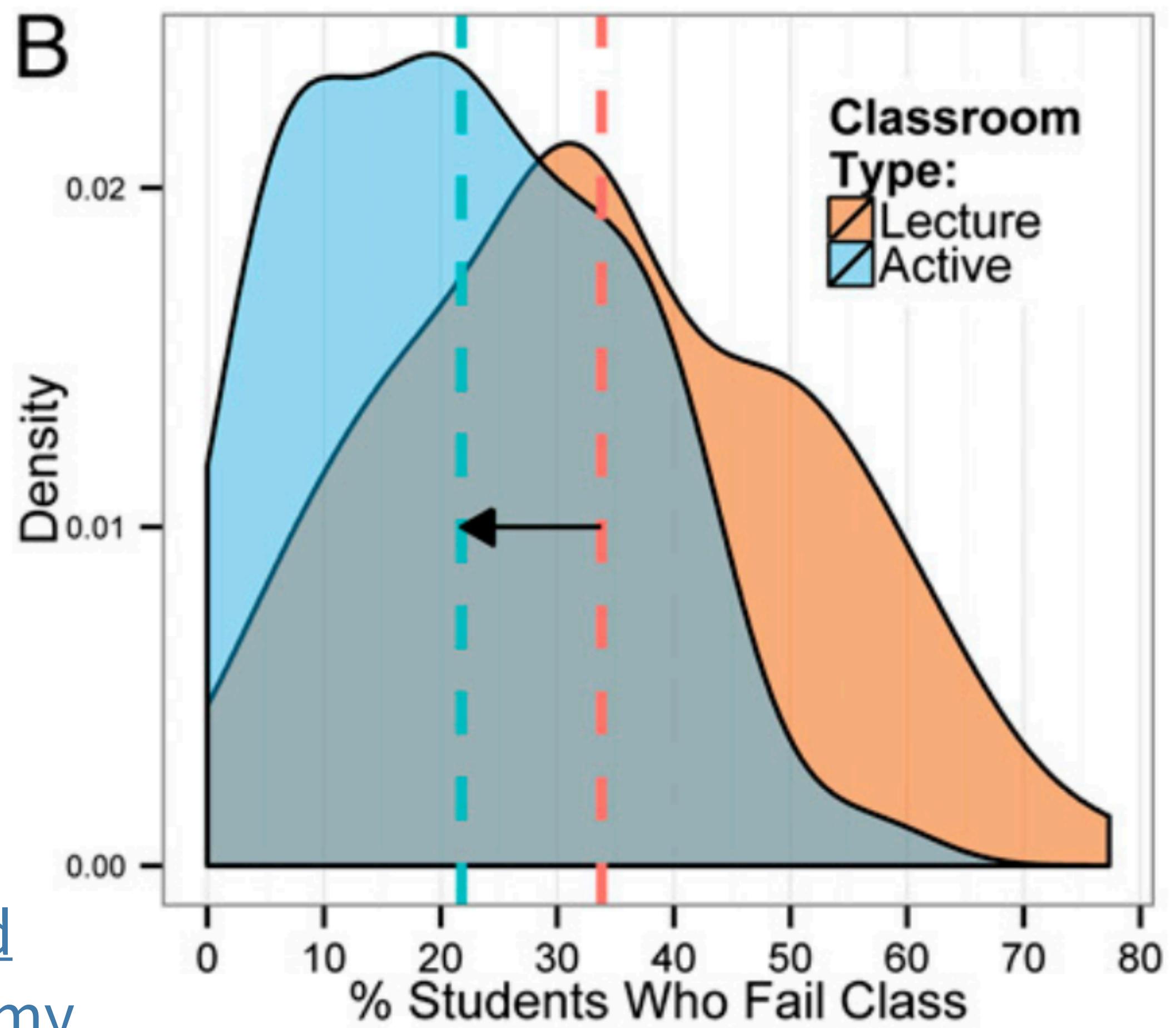
Try to **explain** it

Short sessions with time to try things out in between

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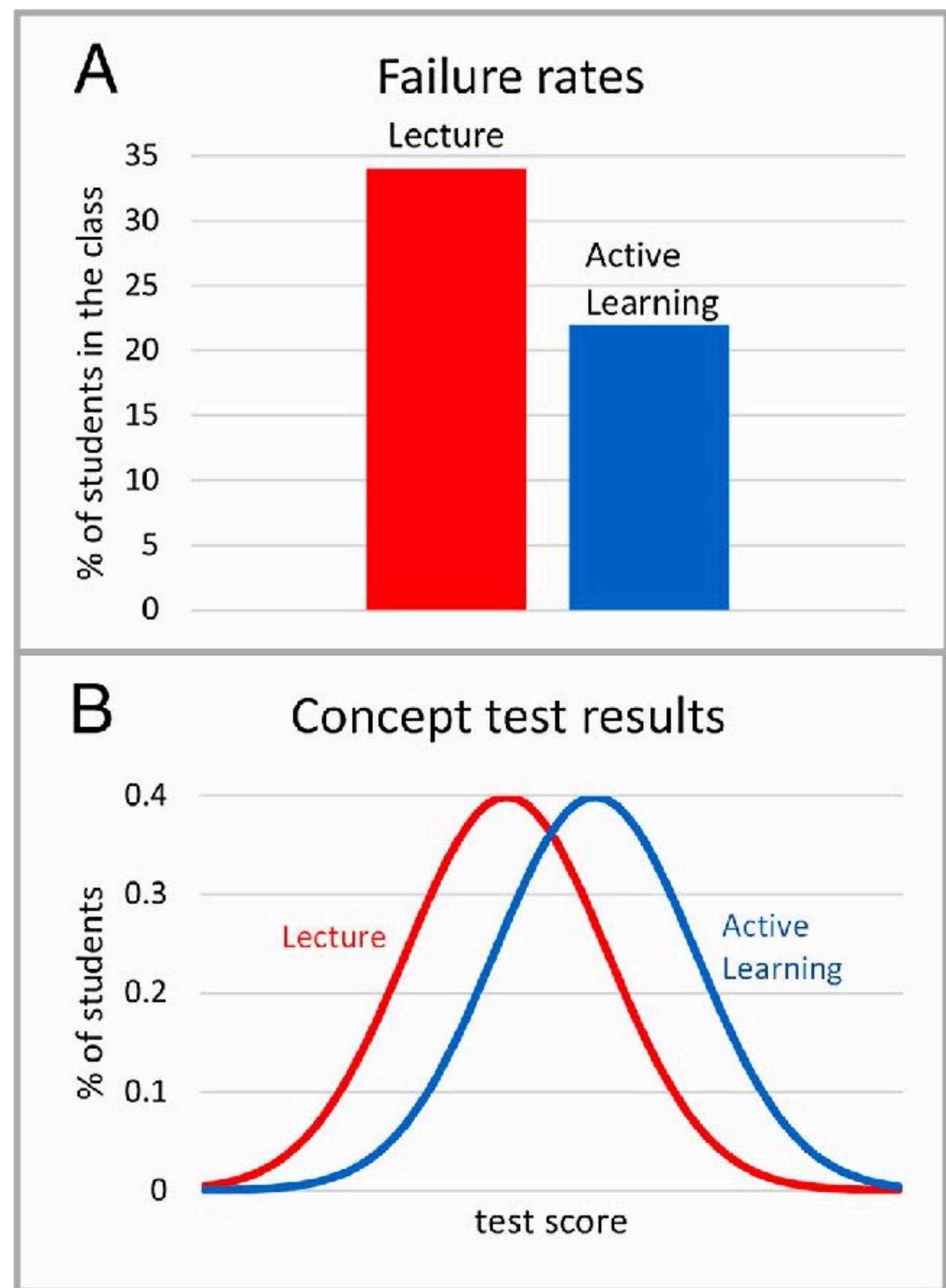
- [Freeman, et al. \(2014\). Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences, 111\(23\), 8410-8415.](#)



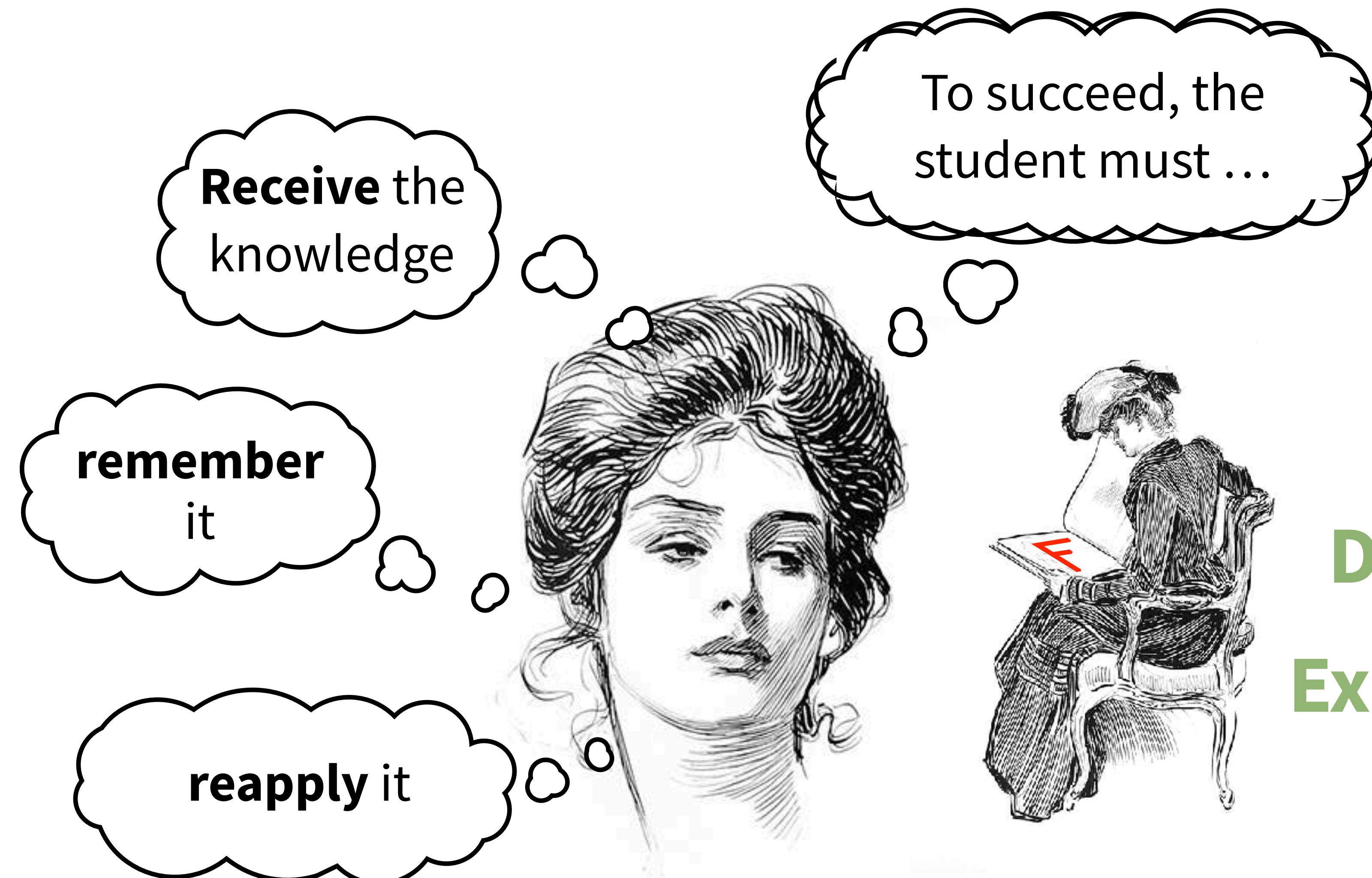
Active learning is any method that requires students to:

1. do something
2. think about what they are doing

- [Wieman, C. E. \(2014\). Large-scale comparison of science teaching methods sends clear message. Proceedings of the National Academy of Sciences, 111\(23\), 8319-8320.](#)



B



Try it

Do exercises

Discuss with an expert

Discover how to solve it

Experience it for yourself

Try to **explain** it

Short sessions with time to try things out in between

Learning is a three part process, in which a student:

1. **Receives** information accurately
2. **Remembers** the information (long term memory)
3. In such a way that they can **reapply** the information when appropriate

Which is the real penny?

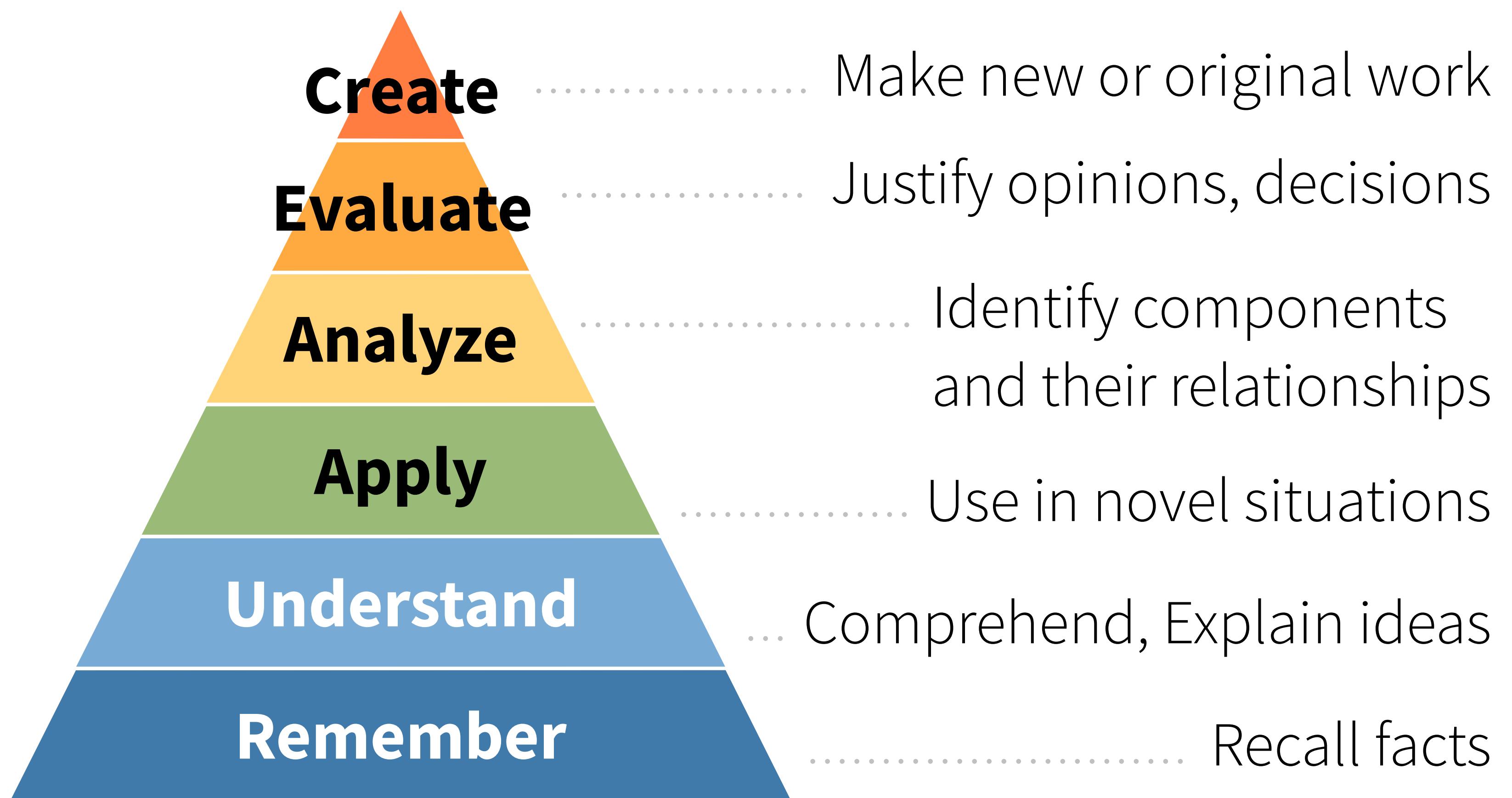


Learning is a three part process, in which a student:

1. **Receives** information accurately
2. **Remembers** the information (long term memory)
3. In such a way that they can **reapply** the information when appropriate

(**Teaching** is whatever helps a student do that)

Bloom's Taxonomy



- Bloom, B. S. (1956). *Taxonomy of educational objectives. Vol. 1: Cognitive domain.* New York: McKay, 20-24.

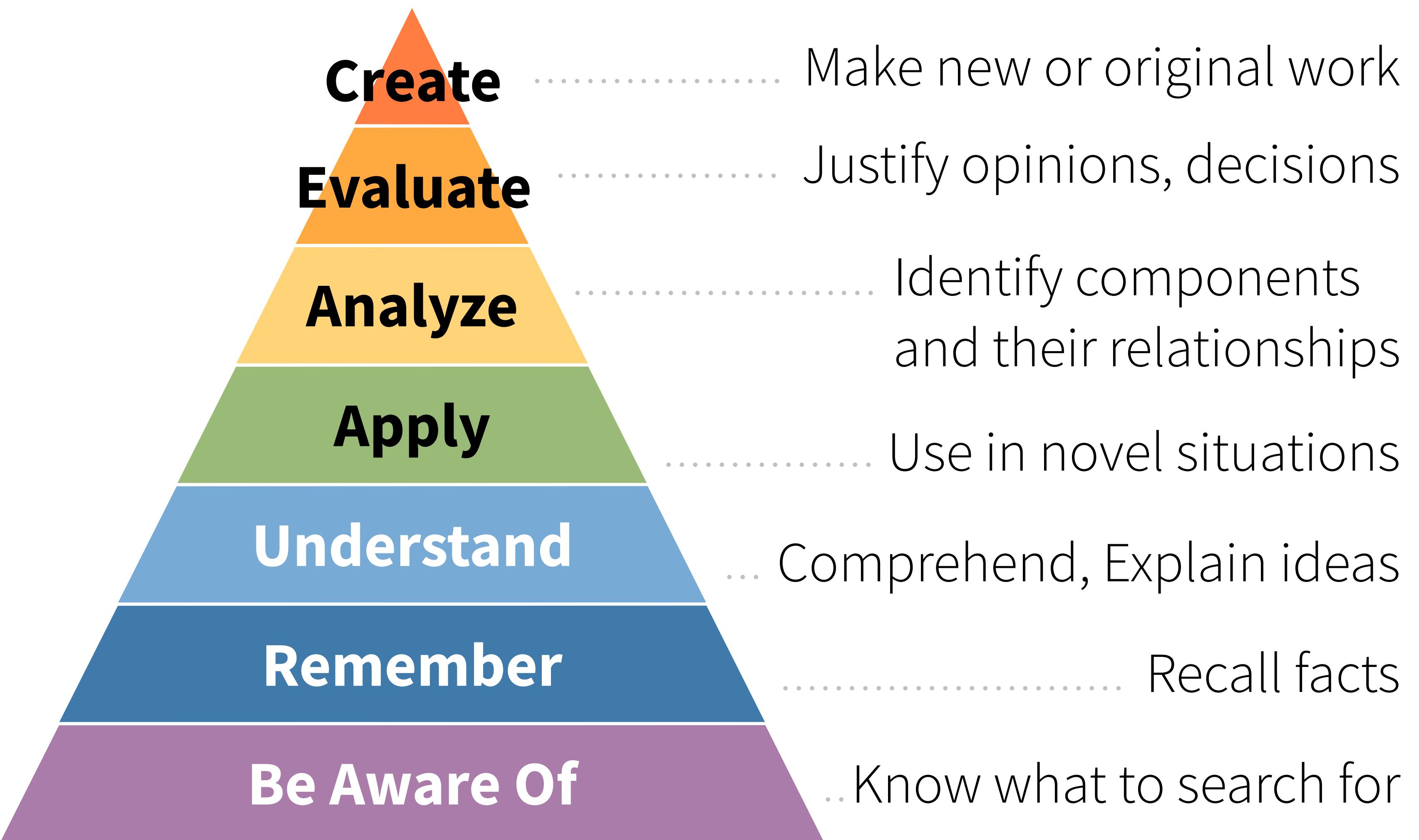
Why do we still learn facts in the age of google?



Google Search

I'm Feeling Lucky

Bloom's Taxonomy



Let students try it

Plan out exercises

Prompt discussion

Guide exploration

Provide experiences

Ask students

1. **Directed Learning** - students work through a pre-determined path of exercises

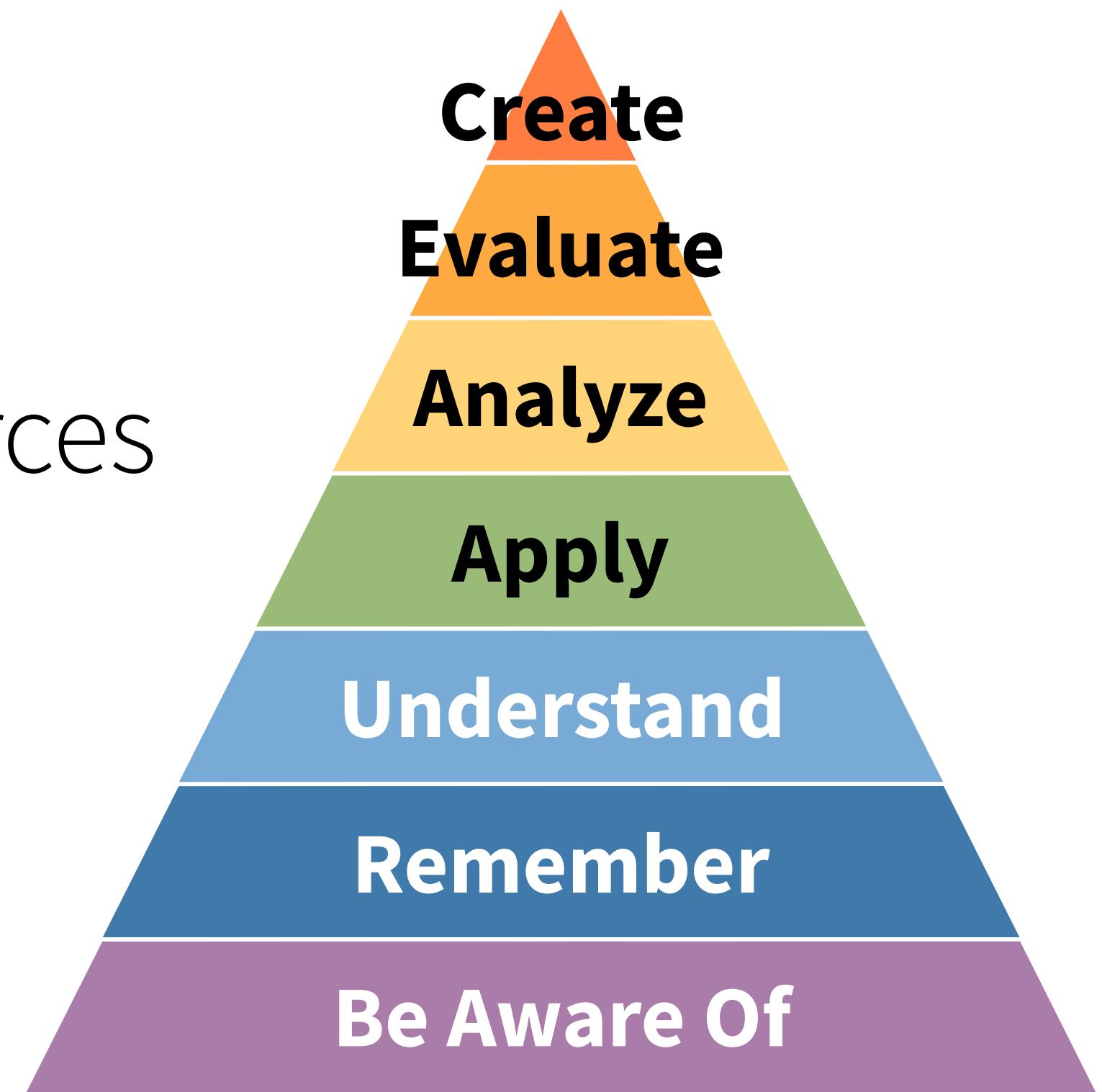
- Flipped classroom
- Master the Tidyverse (current incarnation)

2. **Guided Discovery** - teacher introduces problem, provides feedback

- Problem based learning
- Socratic method

3. **Exploratory learning** - teacher provides resources and a prompt, then gets out of the way

- Montessori Method, Unschooling
- Peer Led Instruction



Your Turn

Complete the **Two Ways to Teach** handout. Then compare your answers with your group members'.



Workshops

R

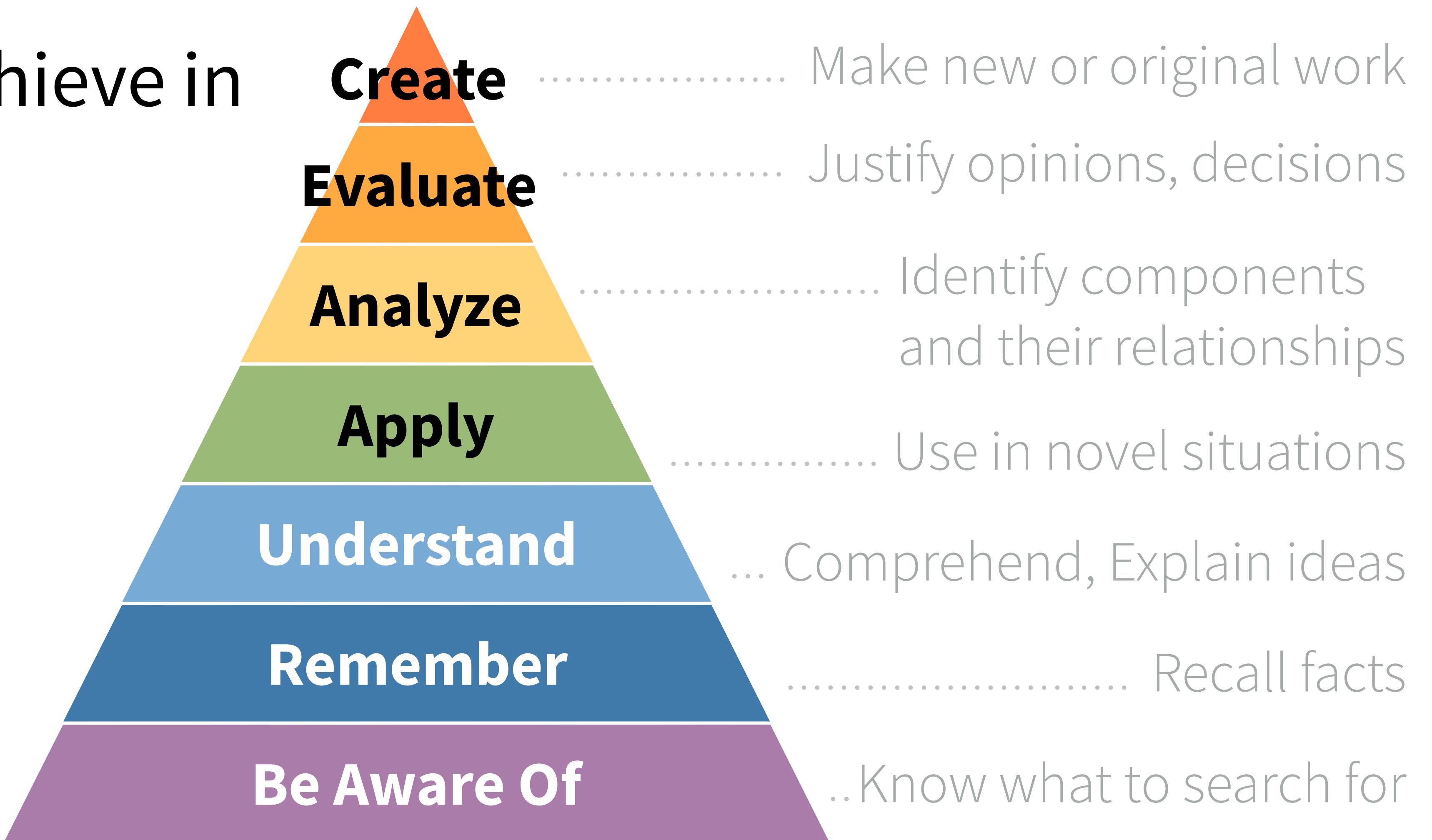
Survey

In a typical college course, does more learning occur:

- inside of the classroom
- outside of the classroom

Which can you achieve in

- two days?
- one day?
- half a day?
- 90 minutes?



A

B

Try it

Do exercises

Attend a lecture

Told how to solve it

Told how it will work

Hear it explained

A **long** learning session that covers a lot of ground

Survey

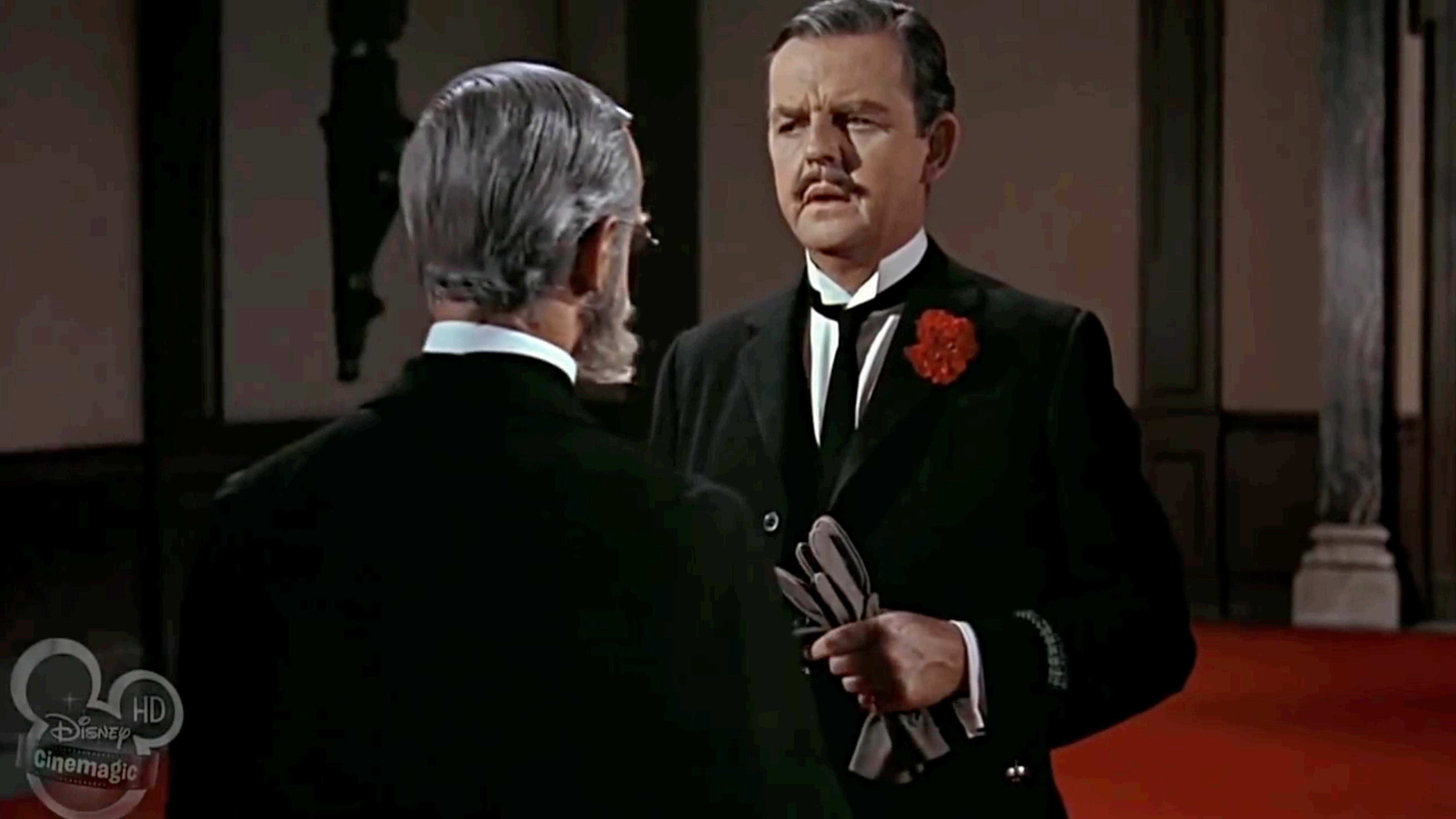
What percent of students can later reapply the knowledge taught in a workshop *when it is relevant?*

60% immediately after the training

40% six months later

30% one year after

- [Saks, A. M. \(2002\). So what is a good transfer of training estimate? A reply to Fitzpatrick. The Industrial-Organizational Psychologist, 39\(3\), 29-30.](#)



Your Turn

Decide in your groups and then write in your own words:

1. What is learning?
2. What is the difference between good and bad teaching?
3. Why is it difficult to teach well in a workshop?



Two Ways to Teach

