

## Talk Less, Teach More

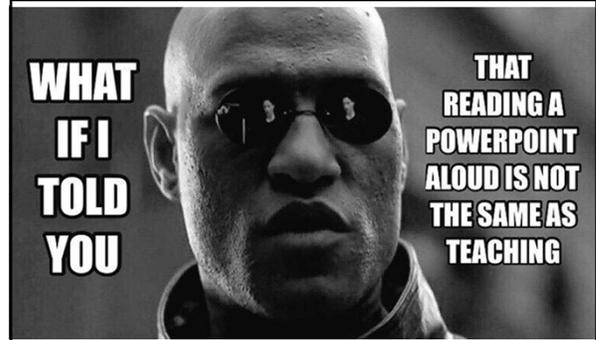
Tactics for converting from lecture courses to active courses

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## My Background

- Professor of Software Engineering
- 28 years of teaching college classes
- Chalk to white board to plastic slides to PPT
- I like to lecture
- I learned to lecture by learning to give research talks

But giving a research talk is  
**NOT THE SAME**  
as teaching !!

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Lectures are not teaching

They are addictive

And slides become a crutch

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## Eric Mazur Taught Me Better

Students learn only slightly  
more from great lecturers than  
from average lecturers

Students learn a lot more from  
active learning exercises

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## Benefits of Active Exercises

- More student engagement
  - Students stay awake—passively listening is hard !
- Increased collaboration
  - An important and useful skill post-college
  - Many students enjoy learning together
- Increased peer-learning
  - Students can learn a lot from each other
  - They can help each other work through difficult concepts and can often understand their difficulties better than professors do
- Increased attendance
  - The return-on-investment analysis becomes much easier

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## But ... Switching is Hard!

“Ya can’t teach an old dog new tricks.”

Habits die hard

We have huge investments in lectures  
Lots of powerpoint slides

How do we manage this kind of change?

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## Thus, My Current Motto

Talk less; teach more

I’m trying to be self-persuasive ...

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## How About You?

- How many years have you been teaching ?
- About what percentage of time do you spend lecturing vs. doing in-class work ?
- What is your field ?

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## Case Study from My Class

SWE 632—User Interface Design and Development  
Homework Review Exercise

Assignment was to evaluate the usability of an automated checkout system (out of class)

<http://cs.gmu.edu/~offutt/classes/632/in-class/week3-eval1A.html>

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## Types of Active Exercises

- Discussion
  - Sometimes cognitive dissonance is best broken by peers
- Writing
  - Fiction, non-fiction, understanding
- Examples
  - Find or create examples to illustrate a concept
  - Analyze an example with respect to a concept
- Problem-solving
  - Size of the problem ?
  - Support tools needed (calculator, computers, software, ...)?
  - Could be integrated with lecture or use a flipped classroom model
- Games or role playing

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## Case Study from My Class

SWE 632—User Interface Design and Development  
Examples Exercise

*Mental model* : A user’s expectation for how something should work

<http://cs.gmu.edu/~offutt/classes/632/in-class/week3-mentalModel.html>

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## Common Questions—Discussion

- Amount of time for exercises ?
- Group size ?
- Makeup of groups ?
  - Gender, age, major, cultural background, academic ability ...
- Assigned or self-grouped ?
- Same groups each meeting ?
- Drawing out introverted and shy students
- Ensuring everyone has a chance to speak up
- Present results to class, submit to prof, or unshared?

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## Case Study from My Class

SWE 637—Software Testing  
Problem-Solving Exercise

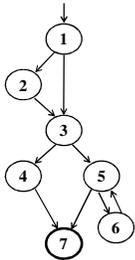
I changed a slide with an example to a setup for students to try the example themselves

<https://cs.gmu.edu/~offutt/softwaretest/edition2/powepoint/Ch07-1-2-overviewGraphCoverage-active.pptx>

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## SWE 637—Problem-Solving



### Node Coverage

TR = { 1, 2, 3, 4, 5, 6, 7 }

Test Paths: [ 1, 2, 3, 4, 7 ] [ 1, 2, 3, 5, 6, 5, 7 ]

Write down the TRs and Test Paths for these criteria

### Edge Coverage

TR = { (1,2), (1,3), (2,3), (3,4), (3,5), (4,7), (5,6), (5,7) }

Test Paths: [ 1, 2, 3, 4, 7 ] [ 1, 3, 5, 6, 5, 7 ]

### Edge-Pair Coverage

TR = { [1,2,3], [1,3,4], [1,3,5], [2,3,4], [2,3,5], [3,4,7], [3,5,6], [3,5,7], [5,6,5], [6,5,6], [6,5,7] }

Test Paths: [ 1, 2, 3, 4, 7 ] [ 1, 2, 3, 5, 7 ] [ 1, 3, 4, 7 ] [ 1, 3, 5, 6, 5, 6, 5, 7 ]

### Complete Path Coverage

Test Paths: [ 1, 2, 3, 4, 7 ] [ 1, 2, 3, 5, 7 ] [ 1, 2, 3, 5, 6, 5, 7 ] [ 1, 2, 3, 5, 6, 5, 6, 5, 7 ] [ 1, 2, 3, 5, 6, 5, 6, 5, 6, 5, 7 ] ...

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## Challenges

- Timing the class is harder with active exercises
- The classroom infrastructure has a major affect
  - Tables, movable desks, immovable desks, rising rows
- Encouraging collaboration can be challenging
  - Many students are not accustomed to collaboration
  - Some do not play well with others
  - Some students prefer competition
- Encouraging diversity of thinking
  - A start of an argument or an opportunity for growth?
- Changing your habits
  - Preparation and your experience in the classroom is very different
- Your interaction—deciding when to step in

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## Classroom Layout Matters



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## Case Study from My Class

SWE 205—Software Usability Analysis and Design  
A Game Exercise

*Excise task* : Something required as part of a process but that does not directly help us achieve our goal

<http://cs.gmu.edu/~offutt/classes/205/in-class/OOtM-Excise-example.html>

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## Open Discussion

Can you adapt these ideas to your classes?

Other questions you have?

Any other issues not covered?

Want to brainstorm some ideas?

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## Contact

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