



Excellence in Teaching Series

Small Teaching Strategies

David Yuill, Ph.D., P.E.

Associate Professor

University of Nebraska – Lincoln

dyuill@unl.edu

About me

- PhD in mechanical engineering from Purdue
- Architectural engineering on Scott campus since 2014

Courses taught:

HVAC Fundamentals (AE 310)
HVAC Design (AE 415)
Hydraulics laboratory (CIVE 319)
Thermodynamics (ME 200)
Heat Transfer (ME 420)

Teaching professional development:

ARISE Learning by Design (2018)
ASCE ExCEED Teaching Workshop (2019)
Classroom Observation Protocol for Undergraduate
STEM (COPUS) (2019)

Methodology

- Engineers: data driven – need solid empirical evidence
 - Very difficult to obtain
 - Highly unconstrained problem
 - “Typical student” changes over time
- My basis
 - Professional development content
 - Three years, 4-6 sections of a course, experimented with methods
 - Unofficial feedback from former students

Teaching Strategies – High level

- If you're committed, you'll succeed
 - Believe effective teaching is important, value student success
- Give up on wishing how students *should* be
 - They won't be like you were
 - Won't read material before class, won't do ungraded homework
 - Many will cheat if possible
 - Currently, want an easy A (or B or C)
 - In the future, they'll value the knowledge

Teaching Strategies – High level

- Optimization objective function:

Maximize students' ...

Knowledge of topic?

Teaching Strategies – High level

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~~Knowledge of topic~~

Performance on final?

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Appreciation of course?

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Teaching evaluations?

Teaching Strategies – High level

- Optimization objective function:

Maximize students' ...

~~Knowledge of topic~~

~~Performance on final~~

~~Appreciation of course~~

~~Teaching evaluations~~

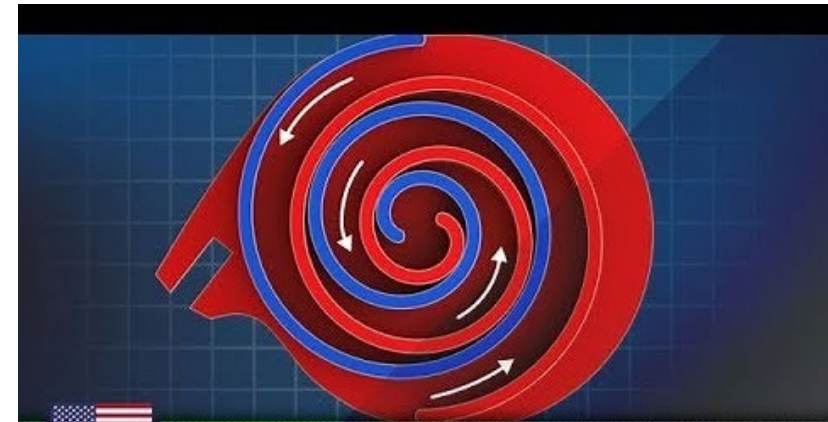
Success in 5-10 years

Teaching Strategies – Specific

- Board notes
 - Surveyed class: PPT with printed notes, Doc. Cam/Tablet, or Whiteboard?
→ Whiteboard
 - Consistent use of color to represent something
 - E.g. Red = Need to memorize, Green = not in textbook
- Learn every student's name ASAP
 - First assignment: send me .jpg with your face and name
- Joke around
 - Best if students *enjoy* coming to class
 - “Your giant disco-dancing robot needs 3500 kW of power...” or “your moose is running at 15 m/s with a mass of 400 kg...”

Teaching Strategies – Specific

- Mnemonics
 - Stefan-Boltzmann: Dancing constant $5.67 \times 10^{-8} \text{ W/m}^2\text{-K}^4$
- Break the lecture up with
 - Short video
 - Show-n-tell items
 - Think-pair-share
 - Walk around building
- For remote teaching
 - Edit the videos (pause to switch colors, show picture, etc.)
 - Radio-button quiz every 5-10 minutes

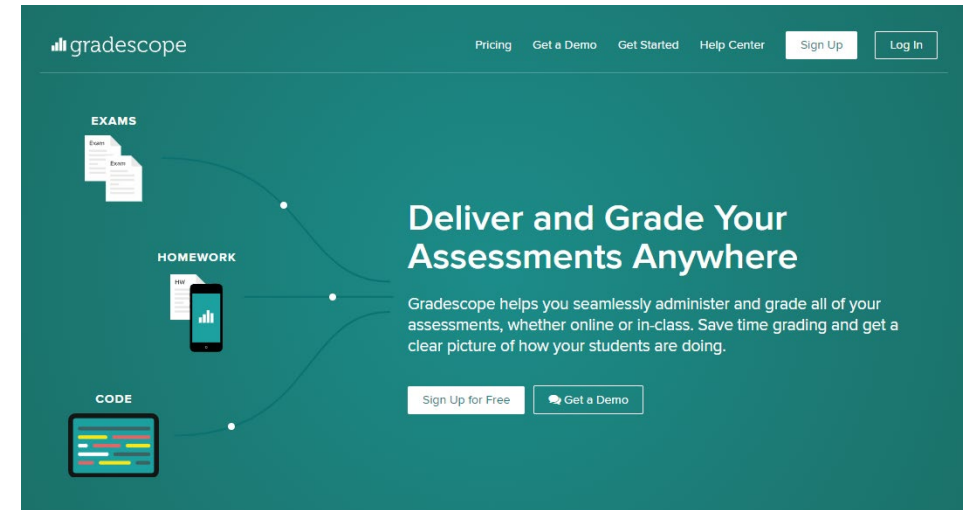


Teaching Strategies – Specific

- No laptops or devices in class
 - Distracting, disrespectful
- Students with kids
 - Bring 'em if you need
 - Phone/text is OK
- Homework every class (due a week later)
- Create new homework problems every year
- TA: grade homework and upload solutions
 - If short of time, don't grade all problems

Teaching Strategies – Specific (tests)

- Grade tests yourself
 - To learn what's working, what's not
 - Use Gradescope
- Closed book and Open Book tests
 - Closed book the class before the open book
- Have Test A and Test B
 - Collate them before you go to class
- Use a seating chart for tests
 - Helps learn students' names!



Front of Classroom

Yuill's Desk																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bryce		Jennifer	Dylan T.		Matt	Jackson		Sarah	Peter	Trever	Izzy		Ben	Jenna		Ish		Nick	Ryan
Parker		Devin	Tori		JJ	Jaifar		Jack	Robert	Dylan D.		Peyton	Ethan H.	Justin		Jay		Ernie	Jacob
Makenna		Cassie	Pedro		Shawn	Mariah		Gage	Sam	Addie		Dawson	Grant	Josue		David		Alex	Grace
An		Ethan S.	Isabel		Anthony	Zachary		Grayson	Masen	Alexander		Alec		Juhaina		Carson		Andrew	Kathryn