Session 7:

Teaching skills: Math and coding

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Highs and lows

- What has worked while teaching methods this semester?
- What challenges have you faced?

Objectives

In this session, we will <u>explore</u>:

- What skills we assess when we evaluate problem sets
- Principles for teaching math and coding
- The connection between teaching skills and inclusion

Agenda

Why teach skills?

Students' prior knowledge

Five principles of teaching math and coding

Designing problem sets

Interacting with students

Wrap-up

Why teach skills?

Learning goals:

- Understand assumptions
- Be able to use methods
- See that analyzing data is fun and useful

Inclusivity:

- Students' prior experiences vary

Learner-centered design occurs in 4 stages*

1-Identify desired results

2-Determine acceptable evidence

3-Plan learning experiences and instruction

4-Communicate objectives to students early and often

Source: Wiggins, G. P., Wiggins, G., & McTighe, J. (2005). *Understanding by design*. Ascd.
*Wiggins and McTighe (2005) propose the first 3 stages; the fourth is Sarah's addition

Who is best prepared to perform well on this assignment?

Question 1 (16 points)

Using the district-level data (`swiss.csv`), first subset to two time referendums: the first election immediately preceding the enactment of compulsory voting (`ref_id = 44`) and the first election immediately after the enactment of compulsory voting (`ref_id = 45`). Estimate the post-treatment average treatment effect on the treated (use `support_left` as the outcome and compulsory voting as the treatment) with (i) a cross-sectional design, (2) a before-and-after/fixed effects design, and a (3) difference-in-differences design. The original paper obtains standard errors that account for clustering at the district-level. Follow their approach and obtain 95% confidence intervals for each estimator, accounting for clustering on district. Report these estimates and their confidence intervals in a coefficient plot. Given the design of the study, are there any problems with accounting for the variance of the estimators in this way?

Question 2 (16 points)

Now, using the data from all elections (not just the two analyzed above), implement two different fixed-effects estimators for the effect of compulsory voting on support for leftist policies (`support_left`). First, use the standard within/LSDV linear estimator. Second, stratify on districts and estimate within-district effects of treatment (for those districts that were treated at some point) and average across the districts. Briefly discuss your results.

From Gov2003 in 2018

Assignment design & grading practices influence who can be successful in our classrooms

Students need to know up front **what good work looks like**, along with the expectation that they can achieve it. **If students have to engage in a guessing game** about what the teacher wants, that **gives an advantage to students whose backgrounds are similar to their teacher's.**

"Strong Teams, Strong Results: Formative Assessment Helps Teacher Teams Strengthen Equity" by Nancy Love and Michelle Crowell in *The Learning Professional*, October 2018 (Vol. 39, #5, p. 34-39)

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- What prior experience might students in Gov classes have with math and/or coding?

- Is this different for undergraduate vs. graduate students?

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Principles for Teaching Math/Coding

(1) Identify the implicit skills being assessed

(2) Communicate skills being assessed

(3) Prioritize criteria for evaluation

(4) Model skills before the assignment

(5) Practice skills before the assignment

Identifying Implicit Skills

- Logic
- Matrix algebra
- Calculus
- Latex/R Markdown
- Types of objects
- Types of proofs (contradiction, induction, direct)
- Creating functions
- Loops
- Debugging

Principles for Teaching Math/Coding

(1) Identify the implicit skills being assessed

(2) Communicate skills being assessed

(3) Prioritize criteria for evaluation

(4) Model skills before the assignment

(5) Practice skills before the assignment

Use Prompt/Rubric

- **Purpose:** Why are you completing this problem set? In other words, what do you want students to learn by doing this assignment?
- **Style:** Should students submit their code? What kind of writing style should they use when answering the questions? What type of file is accepted?

Principles for Teaching Math/Coding

(1) Identify the implicit skills being assessed

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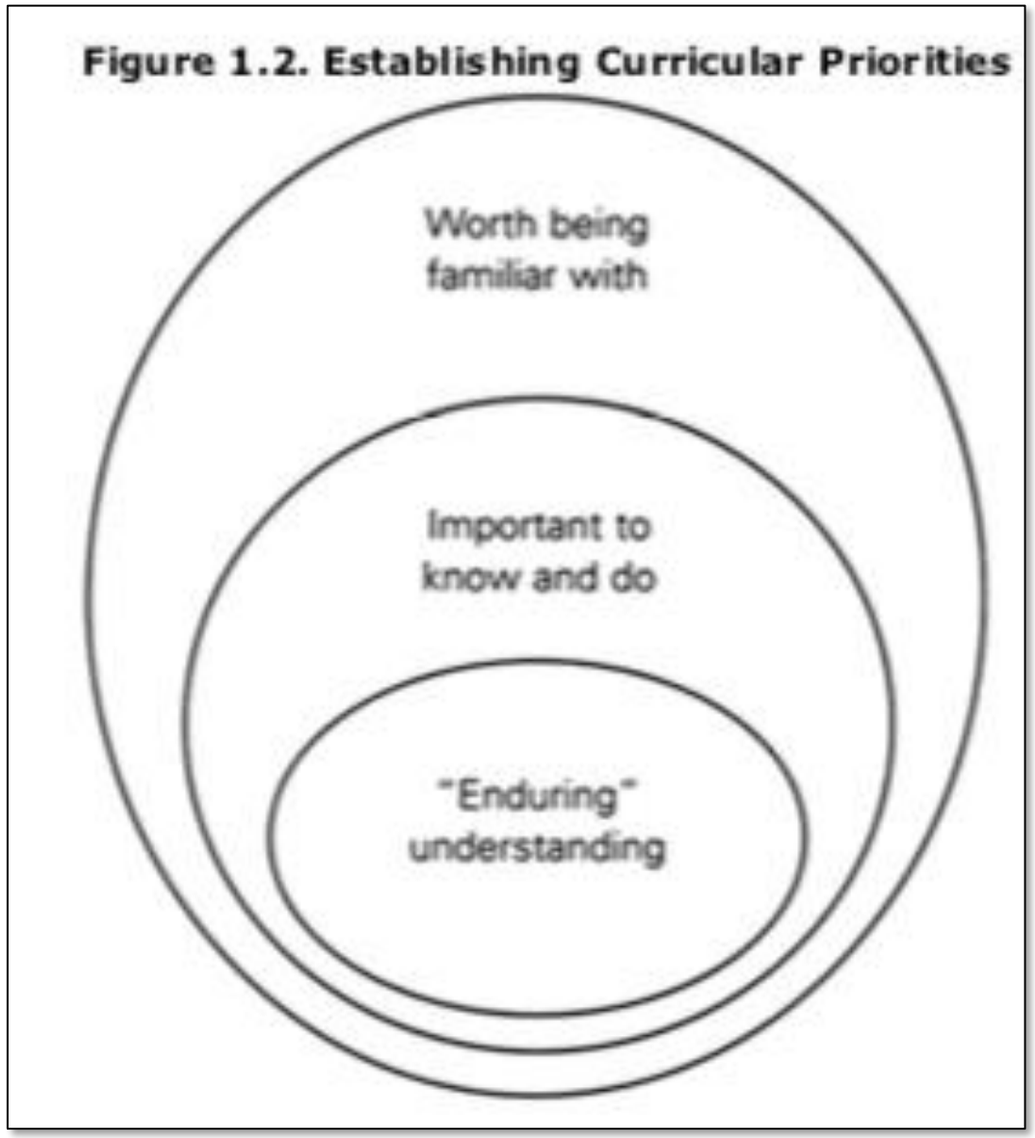
(3) Prioritize criteria for evaluation

(4) Model skills before the assignment

(5) Practice skills before the assignment

Prioritizing Criteria for Evaluation

Criteria for evaluation should be explicit and consistent with learning goals.



Prioritizing Criteria for Evaluation

Are there criteria that you might value **more** in a particular class context? Are there criteria that you might value **less**?

What about for particular students?

Principles for Teaching Math/Coding

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Refer to other slide deck

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Confidence

- Students:
  - Fixed v. growth mindset
  - Be intentional about language
- TFs:
  - Novice v. expert
  - Follow up with students

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Logistics and next steps

- Complete your peer observation (Nov. 30th)

- Keep in touch!