

Comprehensive Interactive Learning: Both in and out-of class

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Why?

- What problem?

Mathematical modeling encompasses the highest learning objectives in Bloom's taxonomy, but more importantly, modeling is a task that cannot be automated.

- Educational Objective:

Enable students to develop the necessary skills to analyze real-life problems, design good mathematical (optimization) models, and use existing tools to solve such problems.

Two-fold innovation:

1. Place the focus on the important creative task of modeling and de-emphasize the mechanical task of algorithmic solution of models.
2. Teach modeling using a highly interactive approach that empowers students to learn by doing.

When?

Developmental history

1. First time I taught Operations Research I (Fall 2011):

- Dedicate half of the course to modeling activities (versus the norm of dedicating at most one third of the course, if not only a couple of weeks).

2. Since I joined Texas A&M in all my courses:

- Strive to promote active student participation *in class* using handouts.

3. Future:

- Develop a comprehensive **interactive teaching environment** by also having interactive *out-of-class* activities (homework).
- Specifically, I envision developing an interactive homework tool (more details in the next section).

Where?

- Have you tried this in other institutions?

Since being a TA at Berkeley, my discussion sections were always interactive, but without handouts specifically designed to promote participation.

- Single class, full course, or a curriculum?

The techniques are applicable to most classes.

But, right now I only use them in OR I.

What?

- Learning activities & materials developed:

Specially designed handouts to promote student involvement in class.

- Theory of change:

Modeling is like poetry: It is very easy to understand, but it is a totally different game to create it.

Specifically, guiding students through the steps, so that they go through the thought process themselves, is far better than giving out the details myself.

- What has worked really well? (in addition to the handouts)

1) Learning all of student's names (even in a class of 80+) also promotes participation.

2) Using an electronic board so that they don't focus on taking all the notes (because they will be posted), allows them to focus on the thought process and maybe write only key points.

Prognosis?

- How are you documenting impact?

Feedback from other professors about how students who took my section are significantly better at using optimization models in their courses (as compared to other students).

- How do you plan to scale-up?

Haven't thought about this...

What challenges are you currently facing?

- Lack of time and resources (but mostly lack of time) to develop the interactive homework tool.

What advice would you like from others at FOEE?

- How to solve the above challenges without jeopardizing my tenure process.