Designing active learning for your classroom to be effective, conceptual and efficient with your time

For your problematic area, you’ve:
• Written a learning goal and an assessment strategy towards that goal.
• Developed and practiced a hook for the start of this instruction.
• Designed the skeleton of an active learning strategy for this topic, with:
  • An understanding of why this strategy and not some other from the list
  • A tentative plan for improvement after the first live trial with students

You need to have in mind:
A problematic class session due for an upgrade

CSU TILT Conference
May 2018

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Today’s last slide
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Me
My ground rules for today:
• Thank you!
• Science: “The incremental improvement of human understanding”
• This is going to be uncomfortable for you
• This is going to be uncomfortable for me
• I want to change your brain, not gain prestige
• Consent?
Framing: By any reasonable comparison, you are an expert teacher.
• Introductions

• Backward Design: Focusing on the goal

• Engaging students: Making connections

• Deliberate Practice:

• Active Learning: Techniques for positive steps

• Conclusions
Which is forward design? Which is backward design?

How would backward design help a student?
How would it help a teacher?

Why isn’t all college teaching done by backward design?
Hopefully, our students learn towards our goal.

How to write a learning goal?
• Statement of student outcome: “Students will be able to”
• Action verb: Not ‘know’ or ‘understand’ which are ephemeral
• Assessable: We can test it later in some real way
• Personally relevant: To facilitate motivation (interest, career, etc)
• Concise: Give space to allow for flexibility and growth

Evaluate this learning goal:
Participants will be able to identify and map linguistic elements of a common phrase by breaking down phrases into individual phonemes.
Evaluate these learning goals - Which is better?

Students can map an equation with two variables that can be used to solve the problem in a given scenario.

Students understand that mapping equations with multiple variables is useful and they know the details that will help to do so.

Students can map any equation requiring two variables on a scenario with trains or moving persons including using exponential notation and possibly parenthetical equation elements.

Now: Write a single learning goal for your course/session.
Assessment of learning goals: Three case studies

• Read through your case study first.
• As you do so, think about:
  • Does the assessment fit the learning goal?
  • Is the assessment reasonable for students?
  • Is the assessment logistically feasible for the instructor?
  • If this assessment is not in good alignment, what would be a better method?

• When you are ready, find someone with the other cases and compare notes.
  • You’ll be tested on all case studies next.
Case Study #1:
The instructor’s learning goal: Students should be able to diagnose points of strategic failure based on the pre-plans and post-facto reports of a naval battle.

Third-year Naval ROTC students have spent five-hour sessions on successive Saturdays examining case studies of two historic sea battles. Experts presented a dossier for each battle consisting of a) of journal entries from commanding officers of each force and b) diagrams of unit movements and c) journalist reports of outcomes of the conflict. The group of 16 students analyzed data from each conflict in chronological order. Students built flow diagrams and sketched maps of the major steps and progress of battle. Feedback was given by instructor praise for accurate diagrams/maps and for correct hypotheses about strategic weak points.

At the end of the unit, students were given complete data from a third conflict dossier built from a very different military era. Students were allowed time during an additional week of group work to understand the dossier and build diagrams/maps.

At the end of the unit, students were assessed by:
• A final written explanation of how the third conflict was or was not similar to other conflicts in the literature
• A multiple choice exam asking for evaluation of a plan of action for a given commander about the conflict from which the data was taken
Case Study #2:
The instructor’s learning goal: Students should be able to predict common diagnoses resulting from routine side errors or effects of Lasik surgeries, especially those most likely to influence rural patients.

Second-year optometry students have spent three 4-hour classes learning about modern Lasik options. The classes have been a mix of seminars from practicing optometric surgeons and medical technology firms. Seven different options have been covered, and review discussions with the instructor have discussed differences, costs, pros, and cons for each method.

Students worked in groups of four over the weekend to build an economic forecast for bringing Lasik into underprivileged rural communities on federal grants. Each group presented a brief summary of their proposed method in a single four-hour class, and the entire class heard instructor feedback on each presentation as they were given.

At the end of the unit, students were assessed by:
• Their active participation in the group project as judged by their peers
• A written exam asking for an in-depth explanation of a single Lasik method
• An oral exam in which the students individually diagnose a model patient with post-Lasik side effect symptoms.
Case Study #3:
The instructor’s learning goal: Students should be able to write poetry in iambic pentameter that carries meaning of both plot and character features.

First-year literature students have each read 5 different plays and 2 common sets of sonnets over the course of a 10-week class. In-class time has been spent discussing the historical background of example plays and pointing out design features in iambic verses that encoded historical information. At the end of each class session, a single new sonnet (anonymously either from a historical author or written by the instructor) was presented to the class for analysis and critique.

In the second half of the course, students practiced writing by bringing single couplets of their own into class for partner critique and occasional group share-out before turning in to the instructor. The best sonnet each week was awarded a small, public prize.

At the end of the unit, students were assessed by:
• The number of prizes that they had won to that point
• A 3-page essay examining the feature density of a given famous couplet
• A timed, in-class composition of an iambic verse based on a modern script (to be judged by the depth and number of features encoded)
Questions about these case studies:

1) Which assessment plan is too time-consuming to grade?
2) Which assessment plan misses the point of the learning goal?
3) Which assessment plan would be improved by eliminating a part?
4) Which assessment plan most closely matches to the learning goal?
Assessment: How will you ‘pay’ students for this learning goal?

• Take 30 seconds to yourself, and decide how you’ll grade this goal.
• When you are ready, we will self-test your assessment design:
  • Does the amount of points make sense for the importance of the goal?
  • Does the amount of assessment time make sense for the goal?
  • Is the assessment aligned well with the instruction?
    • i.e.: Are you teaching at the same complexity that you are testing?
      • What message does it send to students if the alignment is good?
      • What message does it send to students if the alignment is bad?
  • Will a student understand how they were graded?
  • Is this something the student could not do prior to the course?
  • Can you design/grade this assessment in a reasonable amount of time?

Do you need to give points for participation?

Most important!
Goal

We’ve done some work here:

Now, how do we help a student start on the path?

Reality:
Why do so many veteran teachers describe ‘making a connection’ as the single most important skill of expert teachers?

Think about this for 20 seconds.  
After 20 seconds, discuss with a partner.  
Then, I’ll call on someone randomly to discuss their partnership’s ideas*.  

*It’s always OK to pass on answering.

What happens to students who cannot make a connection to the instructor and/or to the topic?

Same thing: Think, then pair up, then share.
Here are four examples of teacher talk. Read and evaluate your example.

• Does this wording seem likely to help one of your students connect?
• Would it have helped you, if you had been the student at that age?
• What is the strategy being used by this teacher?

**Example 1:** There are nights when the moon is up but you can’t see it at all. On most other nights, the moon seems like the brightest thing in the galaxy. Why is that? Using what you know about light, let’s figure it out.

**Example 2:** Try to pay attention as best you can, because lunar progression is often found on the SAT. Learn it here, so you can go to college and learn the fun stuff, like how to calculate a tidal rise in the Indian Ocean.

**Example 3:** I’ve seen you work out complicated problems on the basketball court. Here’s a complicated problem that I think you can master. It’s about the moon. If you can do that, you can do this, and you can study astrophysics.

**Example 4:** When I first learned about the phases of the moon, I thought it was just about whether the moon was up or not. It’s a bigger riddle, and the answer has to do with how light bounces around the universe, which I think is so cool.
The easy part:
Take 2 minutes to write out a couple of notes for the hook of this topic.

Try to keep it:
• Short: 20 seconds (maximum) so that it doesn’t derail the class
• Relevant: Skills, goals, or futures!
• Personal: In your own words that you would actually say out loud

The hard part:
Get a partner, and perform this hook for them as if they were in your class.

What about students who don’t come to class?
The ‘treatment’:
- Creates a difference between racial groups on the order of multiple years of study.
- Can be as small as a single sentence
- An example treatment:

  Say to the students:
  “This verbal test usually shows that members of Race #2 have difficulty with verbal problems.”

This effect is called **stereotype threat**
- Only works negatively
- Only when the subject believes that others believe the stereotype
- Can be countered by great connections
We’ve done some work here and here:

*What does it mean to progress along the path?*

Our theory/frame/model/tactic: **Deliberate Practice**
Lauren is one of the greatest basketball players ever.

This is in part due to a series of excellent coaches, all of whom were vocal with criticism and praise during drills and scrimmages. Whether Lauren made the right or the wrong pass, she regularly heard commentary before the next play or during the next water break.

**Why did this help?**

It’s no secret that Lauren was talented, but the sheer volume of work she did was impressive from a young age. On a typical day, Lauren would complete a shooting-dribbling skill set ~20 times. Each week, those 130-140 repetitions accounted for ~2 hours of skill work alone.

**What is important about this habit?**
Deliberate practice: A case study

Within a day or two, Lauren would master a version of the skill drill. Before another day had gone by, at least one coach would adjust, add, or increase the difficulty of some part of the drill.

What would have happened if these changes had not occurred?

Playing basketball on a National team at age 16 brings lots of difficult moments and tough learning. Lauren was blessed with (or developed) the love for the game even when things were hard. Occasionally, her coaches intentionally re-connected or gave Lauren space when her emotions seemed to lag.

How did this help?

What are the four elements of deliberate practice?
Imagine a single student in your class.

What would it look like for this student to be:
- Given regular, timely feedback?
- Provided with enough practice opportunities to develop a skill?
- Offered new challenges as the student improved?
- Connected and motivated throughout the learning path?
We’ve already used several active learning strategies today.

Using your perceptions of those strategies, which of the following is least likely to be a good fit?

1) A think-pair-share to open up discussion about personally-sensitive ethical topics.
2) A data interpretation module to understand complex patient histories
3) A contrasting case study to align students to deep common feature across different treatment plans
4) A jigsaw to let student groups work through different aspects of the gastrointestinal system
We know our goal, our hook, and what we want to practice. Now let’s design one active learning module.

1) Pick an active learning method by:
   - Choosing you are interested in trying
   - Choosing randomly from the list

2) Write a time progression for the class or method.

3) Check your progression with a partner.
   - Do you have enough time for each part?
   - When do you get information from the class about how to proceed?

4) Make a checklist for what you will need to develop
   - [Diagrams? Questions? Slides?]

5) For the most important item on the checklist, make a sketch of what students will see.
   - Check this sketch with a partner

6) If you have time, flesh out that sketch and start to design the material.
   - We will present to the group in 14 minutes, so each individual step should be relatively short.
‘Following through’ is a clichéd way of saying that you do what you said you were going to do. For expert teachers, following through is a crux skill.

We’ve worked today through the end, beginning, and intermediate steps of teaching and learning. Using what you discussed today, explain:

**Why is following through so valuable?**

You have 3 minutes to come up with a written answer.
The quiz

For each statement, judge whether it is True or False.

1. Following through is important for deliberate practice.
2. Connections can be made more deeply with teachers who routinely make sure to follow through.
3. Teachers who follow through are likely come up with good ideas about new ways to teach.
4. Good backward design requires some following through to be implemented in teaching.
5. Following through is important for Think-Pair-Share.
6. Many expert teachers follow through as a way to both drive learning and repeatedly build motivation.
7. Active learning is impossible without following through.
Resources and reading

Fundamental texts on teaching and learning (in addition to Ambrose):

- The standard: How People Learn
- The most accessible and helpful: The ABCs of How We Learn
- The most comprehensive: Cambridge Handbook of the Learning Sciences
- A neurological perspective: Brain Rules

Specifics on particular methods and issues:

- Peer instruction (Mazur)
- Deliberate Practice (Ericcson)
  - The academic original
  - A more readable guide
- Stereotype threat (Steele)
  - A change-focused website
  - A readable academic introduction
- 21 Ways to activate your classroom (Tanner)
- Sociocultural learning theory (Lave, Wenger)
**Active learning design**

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**Active Learning Methods:**

(* = done today)

- Jigsaw*
- Guided inquiry
- Interrupted case study*
- Contrasting case Study*
- Formative assessment*
- Audience Response Qs*
- Random Call
- Peer Grading*
- Scaffolding*
- One minute paper
- Hypothesis building
- Evaluation of an example*
- Peer instruction*
- Data interpretation*
- Free write
- Think-pair-share*