Learning to Teach…

… Teaching to Learn

A view from the trenches of a large freshman course

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My (teaching) background

I have:

… no formal background in teaching

… been teaching in the physics department at McGill for ~< 20 years

… taught at all levels: freshman, undergraduate, graduate

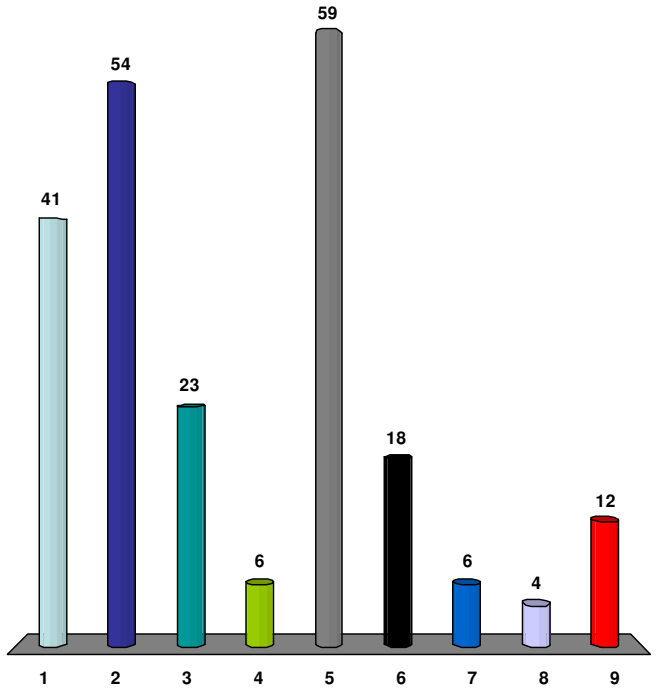
… recently (5+ years) taught large (several hundred) freshman courses

… taught a mix of 'physics friendly' and 'physics hostile' clientele

… survived… and maybe even prospered!

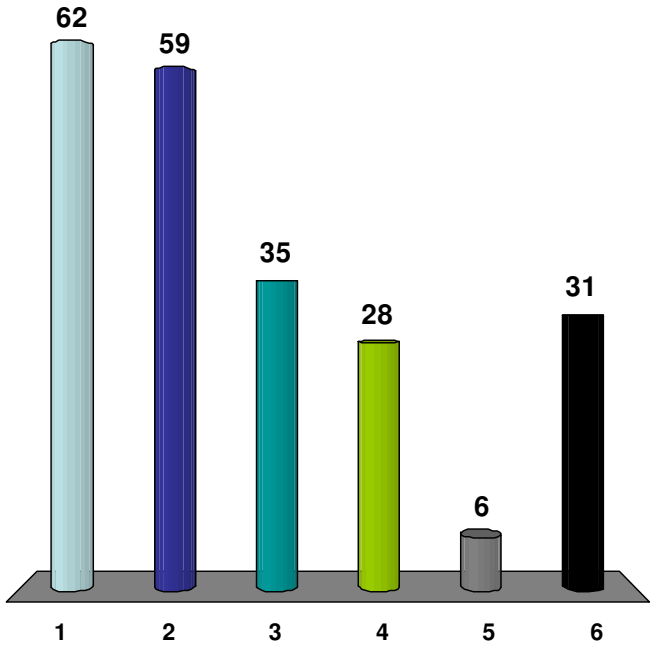
How about you: what is your faculty/school/unit?

1. Arts
2. Sciences
3. Education
4. Management
5. Engineering
6. Medicine
7. Music
8. Law
9. Other



How much teaching have you done?

1. None
2. A few classes/labs/tutorials (<5)
3. “Many” classes/labs/tutorials
4. Regular classes/labs/tutorials
5. Delivered most of at least one course
6. Been primary instructor for at least one course



Learning to teach

In academia, few are selected based on teaching.

So "Learning to teach" … seems like a laudable goal.

My concern: "Learning to teach" seems to imply there is a way to teach…

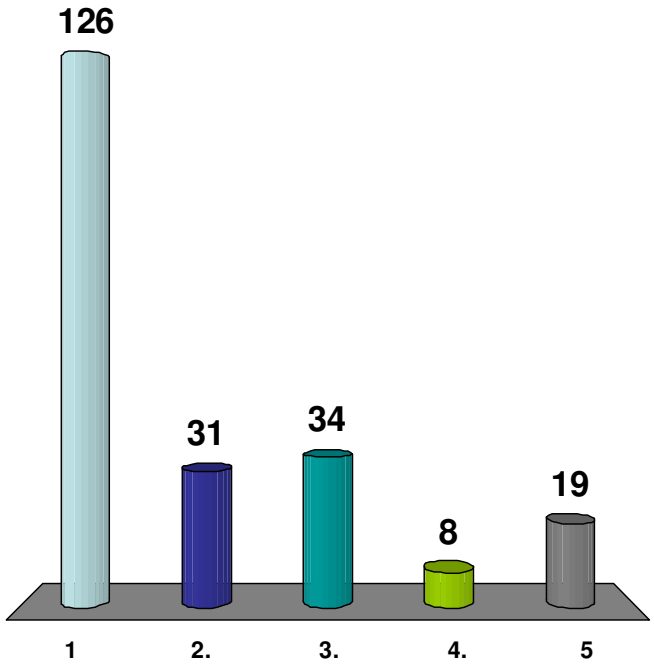
Perhaps the focus needs to be on the result, not on the process

Surely the desired result is learning, not the process of teaching:

So "Learning to teach … to learn".

How important was your teaching in getting you to where you are now, on a scale of 1 to 5 (one: not important at all; 5: very important)?

1. Not important at all
2. 2.
3. 3.
4. 4.
5. Critically important



What we can offer…

We are the "knowledge experts"… guides through a thicket of new material

We need to offer a view of the forest even as we're explaining the trees

Above all: we offer our passion and enthusiasm for what we teach…

Teaching to learn

To my non-expert eyes, learning is a marvelous and complicated process!

Many different types of learners… many different types of learning.

We should strive to offer as many possibilities/strategies to students as possible: a smorgasbord of learning

Let students pick out what works for them!

What works? Ask…!

Students need feedback – and so do you

Students are the best ones in a position to know what's working for them – ask them:

- what isn't working
- what would work for them
- what can be done to improve their learning

An example from Physics 101

First or second class: poll students on:

- their level of physics
- their feelings about taking physics
- what they'd like to get out of the course

About 4 weeks into term, repoll:

- what they like (if anything!)
- what they don't like
- what could be done to improve their learning

Questionnaire feedback

- As usual, they were fun to read!
- What you like:
  - demos
  - in-class examples
  - clicker questions and discussions
  - CAPA (!)
- What you don't like:
  - speed and amount of material
  - CAPA (!)
  - long lectures
- What you'd like me to do differently:
  - slow down !
  - talk more slowly
  - go through examples more thoroughly
  - write more neatly on slides
  - post list of sections covered and review material

Real feedback from Phys 101

The gems

Real feedback from Phys 101

- like:
  - corny jokes
  - silly prof
  - pika (What I should do differently: evolve to a Raichu!)
  - colorful shirts (??)
  - "incidentally…"
  - my accent (what accent?)
  - your messy handwriting – all of these people are future doctors so they need to get used to it!
  - I haven't fallen asleep… yet!
  - the sick demos
  - a nice 1.5 hours sleep after bio
  - I love your class but my Dad may hate you if you lure me into majoring in physics…
  - "If only chemistry was more like this course…"

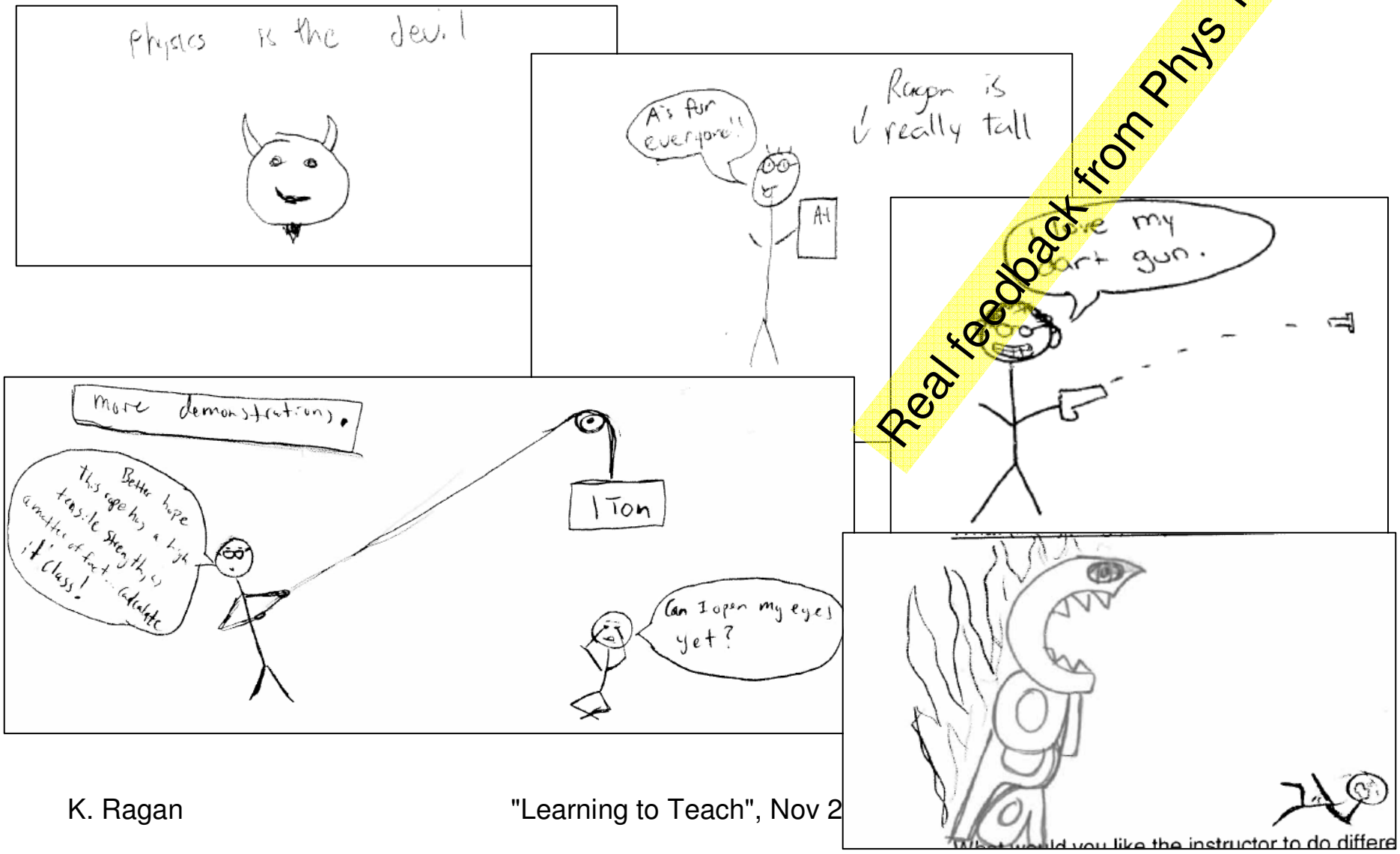
The gems

Real feedback from Phys 101

- don't like:
  - grey hairs (mine? Yours? Not clear…)
  - red pen on the slides
  - not enough 'real-life apps' (like pokemon battles, Toyko drifting, airbending)
  - CAPA (it's a love-hate relationship)
  - physics takes a piece of my soul on every CAPA assignment
  - I stop paying attention and play worms or warcraft (the 1994 original)
  - lack of food, such as a hot-dog guy wandering the aisles…
  - need more legroom

- do differently:
  - "True"
  - more dangerous demos… (like jump off higher tables)
  - physics and Prof. Ragan are very unluckily not logically compatible to me
  - if you wander, wander to the back row too!
  - wear more red
  - go slow over electricity
  - nap time?

The (graphic) gems



What do I do differently…?

As a result of student feedback:

- more in-class problem solving
- more in-class clicker (conceptual) questions
- many more demos in class
- enhanced use of applets, video clips, topical news stories
- modified tutorial schedule
- one tutorial (problem-solving) session by professor each week
- modified labs

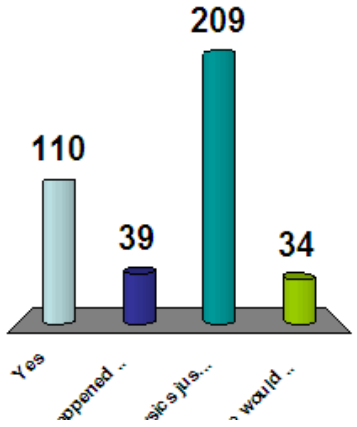
Goal is to give students as many options as possible to enhance learning…

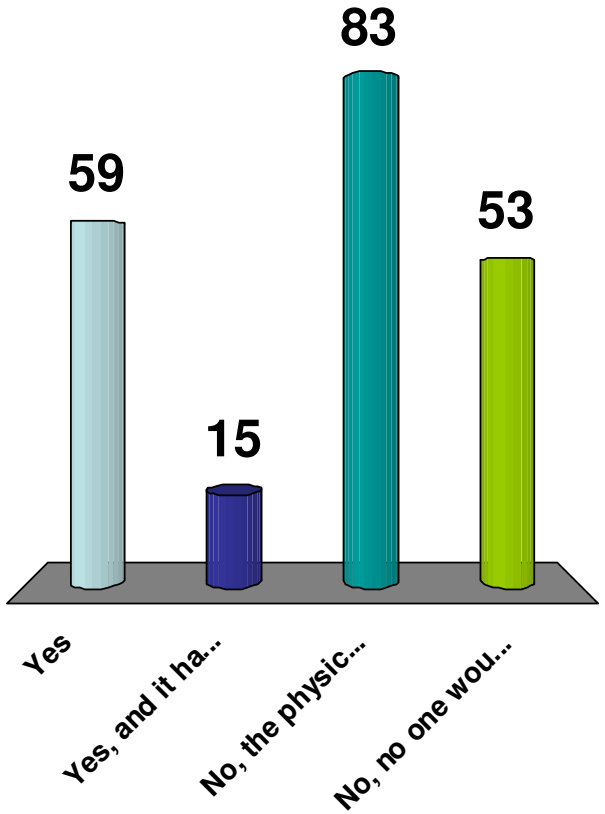
Is the physics of this clip realistic?

1. Yes
2. Yes, and it happened to me!
3. No, the physics just doesn't work.

Is this realistic?

1. Yes
2. Yes, and it happened to me!
3. No - The physics just doesn't work!
4. No - no one would be so dumb as to fall asleep with friends like that around





Technology or no technology?

My view: don't use technology for its own sake.

Technology has to work for you, and for your students

Has to be as bullet-proof as can be …
What I use:

- Tablet computer (annotation, problem-solving in real time)
- Numerous applets & video clips
- Lots of demonstrations
- Course recordings
- Extensive use of course management system
- Student response systems ("clickers")

A special mention to…

Student response systems ("clickers"):

- give instant feedback on understanding of material
- provide a welcome break to routine

- allow for peer instruction: the teaching of students by students!

  - also very evident in Physics 101 in mycourses bulletin board posts

The bottom line

- It's not only about "how to teach": it's about "how they learn"
- Your students are your best allies; respect them, listen to them, enroll them to help you, and learn from them
- Technology may help but it's not a panacea
- Don't be afraid to show your passion