

## Confessions of a Teacher Man

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## Early Academic Landmarks

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- Advanced Kindergarten
- Sputnik and Teaching
- Zen of Learning (MIT)
- Explosives to 360 Assembler (Military)

## Being a Teacher

- Is NOT like being a tennis pro
  - Even Jiri Vanek (#100 ATP) makes about \$90K/year
  - Travels all over the world
  - Gets lots of requests for autographs from girls thinking he is Roger Federer (\$2.4M last year)
  - Probably wants to avoid having to teach other players
- Is like being Ken Wong, racquetball pro
  - Low career earnings: \$5,000
  - Sometimes travels more than 1,500 miles
  - Can never be mistaken to be anyone famous
    - Except: Wayne Wong, 1<sup>st</sup> free style world ski champ (circa 1972)
  - You can enjoy teaching others to become even better than you

## Let's Get a little Serious

- My first real course evaluation
  - Maintain high but reasonable expectations
  - What counts is 5-10-20 years later
  - "*Forward leaning*" exams are good, but hard to write
- In the classroom
  - Get the logistics right
  - Don't ask students to work on a problem that you or your grader hasn't tried
  - Challenge the strong; Strengthen the not so strong
    - Have compassion
  - Grading is a conversation between you and the student
  - You will be able to assign grades after 3 weeks with a success probability above 0.90
    - But you can still have a +/- impact

## Why Students Fail to Learn

"Most children fail in school ... Except for a handful ... they fail to develop more than a tiny part of their tremendous capacity for learning ... They fail because they are afraid, bored, and confused.

John Holt  
How Children Fail, Revised Ed, 1982

"The student should acquire as much experience of independent work as possible. But if he is left alone with his problem without any help or with insufficient help, he may make no progress at all. If the teacher helps too much, nothing is left to the student."

G. Polya  
How to Solve It, 1957

Learning is a cooperative effort between you and the student

## The Dilemma

"... the best teaching can be done only when there is a direct individual relationship between a student and a good teacher

- a situation in which the student discusses the ideas, thinks about the things, and talks about the things

... But in our modern times we have so many students to teach that we have to try to find some substitute for the ideal."

Richard Feynman  
Lectures in Physics, June 1963

## A Remote Lab Learning Environment

- Pre-canned experiments as well as new ones
  - How to structure to max learning rate and flexibility?
- Student model versus Actual model
  - How to discover and correct discrepancies quickly?
- Support group formation
  - How to develop a support network of peers and mentors matched to a student's needs?
- Rules to Principles to Laws from experimental data
  - How to discover fundamental relationships?
- Knowledge amplification through collaboration
  - How to develop new insights through collaboration?

## Technical Reading Favorites

- Stephen King, *On Writing: A Memoir of the Craft*
- G. Polya, *How to Solve It*
- Richard Hamming, *You and Your Research*
  - Transcription by J. F. Kaiser
- Julius Getman, *In the Company of Scholars: The Struggle for the Soul of Higher Education*

## And Thanks To

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